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Platers Hold Good Convention at Chicago

Educational Sessions Bring Together Men From All Parts of Country—Interest in Advanced Technique Remains Intense

THE twenty-first annual convention of the American Electroplaters Society was formally called to order on Tuesday morning, June 24th at 10 a. m. Although the registration showed a decrease in attendance, it was conceded by all that the educational programs were fully as interesting as those of other conventions.

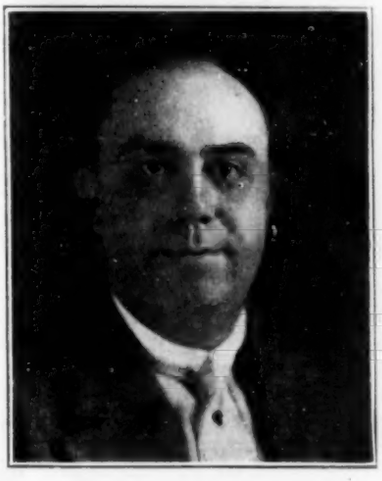
Frank J. Hanlon, General Chairman of the Convention Committee welcomed the members and guests and then introduced Mr. Fred G. Miner, representative of the Century of Progress and personal representative of Mayor Kelly of Chicago. Mr. Miner promised the convention as a whole a good time while in Chicago. After Mr. Miner had concluded his remarks, Mr. Hanlon continued introductions by presenting the members of the convention committee, the present officers of the Chicago Branch and the newly elected officers, the latter to be installed early in July. Mr. Hanlon made a few remarks relative to the convention schedule, including the important features of the Century of Progress, and C. S. Tompkins followed by giving an outline of the general program.

Mr. Hanlon then turned over the meeting to C. A. Van Derau, Supreme President who ordered a roll-call of delegates. This was followed by the reading of reports of all Supreme Officers, including the President, Secretary, Treasurer and Editor as well as the reports of committees appointed during the past year.

Educational Sessions

The first educational session was called to order Tuesday afternoon. At this and later sessions the following papers were read and discussed:

Faraday, Electroplating in His Time and Today, by Geo. B. Hogaboom, Research Engineer. It was brought out that there was more activity during the first fifteen years after the discovery of electroplating and the past fifteen years than at any time in the history of electroplating. During the first fifteen years the aim of the investigator was to produce an electroplating solution. During the past fifteen years extensive research has been done on what happens in the solution and what is the character of the electrodeposit. Between these two periods the principal discovery was that of nickel plating by Isaac Adams and the development of the electroplating generator by Weston, which was exhibited in 1866 at the Centennial Exposition. It was stated that history had repeated itself in a number of instances in regard to definite phases of the art. There were the same controversies and lawsuits over the validity of patents as exist today. At three great exhibitions plating has stood out: in 1851 in London; in 1856 in Philadelphia, and today in Chicago.



FRANK J. HANLON

Chairman of the General Convention Committee

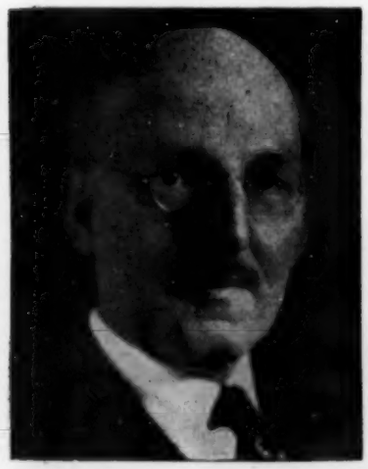
The A. E. S., its Ideal and Aspirations, by Charles H. Proctor, Founder of the Society. Mr. Proctor deplored the fact that the American Electroplaters Society has wandered from its original purpose, which was the education and advancement of the electroplater himself. He thought that the present research work was making it possible for the chemist and engineer to supplement the plater in the industry and

he hoped that the Society would return to its original aims.

A Plater's Qualifications, by C. A. Van Derau, Plating Engineer, Westinghouse Electric & Manufacturing Company, Mansfield, Ohio. The plater should study other things besides chemical and electrical control. He must have a knowledge of the methods of operation in processes both previous to the time the work comes to the plating room and after it leaves it. He must learn to supervise and depend upon trained assistants, so that he can devote his time to the improvement of quality and reduction of costs. He must find the best way possible to do a job in exactly the same manner as one would study the best route if one were travelling to some definite destination. He stated that trouble in the process of work is generally due to the lack of a definite system. The plater must organize, deputize and supervise and must be able to anticipate the problems of tomorrow.

Summary of Research Work at the Bureau of Standards, by William Blum, Bureau of Standards, Washington, D. C. A review of this paper will appear at a later date.

Cadmium Plating on Full Automatic Machine, by F. L. Greenwald, Plating Engineer, W. C. Grunow Corporation. The full automatic machines lend themselves to continuous production and give a uniformity that cannot be had in any other way. A careful study can be made of solutions and their control, and the relation of anode to cathode area, thereby keeping uniformity of deposits.



GEORGE B. HOGABOOM

Electroplating Engineer Who Read a Paper on Faraday

Notes on Stray Currents in Plating Baths, by Gustaf Soderberg, Udylite Process Company, Detroit, Mich. It was shown that not enough attention is being paid to the insulating of the tank bus bars. The uniformity of thickness of coatings of certain objects in the tank are generally influenced by the stray currents — that is the by-passing of the current through any steel or lead lined tank. It was shown that in a rubber lined tank, if intermediary electrodes are present, the electrodeposit will be upon them rather than upon the work and this causes thin deposits. Stress was laid upon the necessity of controlling the current and knowing just where it is going; otherwise it will not be possible to obtain deposits that will meet specifications. This paper brought out more discussion than any paper in the meeting and indicated that the plater must pay more attention to the electrical conditions existing in the plating room.

The Use of Acids in Preparing Steel for Plating, by Walter Barrows, Toronto Branch. Comparative tests were made of the value of sulphuric and hydrochloric acids as a preparatory dip for steel on nickel plating. A large number of samples was prepared that were processed in several ways. These were exposed on a roof in Toronto, Canada. It was found that so long as the quality of deposits and their thickness were uniform, the kind of acid used in preliminary cleaning had no effect upon their resistance to corrosion.

Practical Methods of Cleaning Before Plating, by C. E. Clindinin, Chief Chemist, General Spring & Bumper Corporation, Detroit, Mich. Emphasis was laid on that fact that regardless how good the plating operations might be, all would be of no value if strict attention was not paid to cleaning methods. Upon cleaning depends the quality of plating, more than upon any other one factor. Every particle of dirt or rust or other matter must be thoroughly removed and all rinsing should be done in the best possible way. Both immersion and electric cleaners were advised. It was recommended that two cleaners be used; the first to remove any excess of grease and this solution should be changed often; the second to do the final cleaning. From this bath the work would come in such a condition that the rinsing would be more thorough and so that no foreign substance would remain upon the work or be carried over into the plating solution.

Modern Etching and Coloring Methods, by G. H. Mamerow, Crowe Name Plate & Manufacturing Company, Chicago, Ill. A complete and very definite story of the process of making name plates was given. The method of applying the resist, the solutions used for etching and the processes used to obtain the final finish were explained. A large number of samples illustrated the processes. This was one of the most interesting of papers and it is one upon which practically nothing has ever been presented to the body of electroplaters. Mr. Mamerow is to be congratulated upon his frankness in telling many of the things which have hitherto been considered secrets.

Methods of Stripping Plated Coatings, by A. Brenner, Bureau of Standards, Washington, D. C. This was a preliminary report of some of the work that was done by a member of the research staff of the Bureau of Standards. In the meeting of specifications for thicknesses of electrodeposited coatings, it is essential that rapid and accurate methods be developed for stripping the deposits. Going through the literature very few points of value were found. The process developed by Dr. Burgess for removing brass from brazed joints of bicycle frames might be used for stripping nickel deposits directly on steel. The same process might be used for stripping work that was to be replated. Copper deposits were stripped in cyanide solution with or without the current. It is hoped that more work can be done upon this important subject, as the plater will eventually be required to make his own measurements.

A Century of Progress in Nickel Deposition, by William M. Phillips, Research Department, General Motors Corporation. A brief history of electroplating from ancient times until today was given by Mr. Phillips. He then reviewed the work that was done by Dr. Isaac Adams in 1869 which was the actual beginning of commercial nickel plating. The development of nickel plating was then traced through the addition of chlorides, boric acid and other addition agents. The displacement of double salts by single salts was recommended and then a solution was

brought out by the work done by Dr. Watts on nickel solutions. The story of the development of high acid solutions and rapid plating was told. This was illustrated with a number of slides of electrical equipment from the wet battery to the present day modern generator. A diagram of a plating room of early days was shown in which there were still tanks and this was followed by the development of electroplating equipment such as semi-automatics and full automatic machines.

Impurities in Nickel Solutions, by F. J. Liscomb, Research Engineer, Chicago, Ill. The effect of minute impurities in nickel solutions had been investigated and it was found that quantities that could not be determined by chemical analysis often caused rough deposits. The solutions when analyzed would be in perfect condition, but the deposit would be streaky. Mr. Liscomb traced this to many impurities such as iron, sizing from bags, impure water and the introduction of organic matter. He found a novel means of purifying a solution. This consisted of adding a very small quantity of iron sulphate to the solution, bring the pH to about 6.5 and then adding hydrogen peroxide. The peroxide oxidized the soluble iron and due to the pH of the solution, all the iron was precipitated in a colloidal form, and carried with it all the impurities present in the solution. By following this method he stated that many solutions that would otherwise have to be discarded could be entirely rejuvenated.

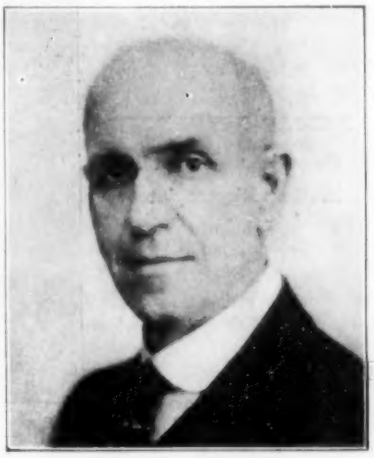
Microscopic Measurement of Copper and Nickel Plate Thickness on Steel, Brass and Zinc Die Castings, by Fred Carl, Guide Motor Lamp Company, Anderson, Ind. One of the outstanding papers of the convention. Mr. Carl indicated that electroplated coatings should be specified by their thickness. These coatings can be of a single metal or composite deposit. These are easily measured by the microscope. One interesting feature of microscopic examination is that where a coating of copper is buffed, the amount of metal taken off by the buff on sharp corners or edges can readily be seen. This gives a check not only upon plating, but also upon the buffing.

Factors Contributing Toward Quality in Plated Zinc Die Castings, by Carl Hussner, Chrysler Motors Corporation. Mr. Hussner told of the endeavors of the automobile industry to add to the life of electroplated die castings. He had plated several thousand samples and exposed them on a roof of a building in New York City. He found that it was important that the die cast metal should be free from impurities. Regardless of how good the electrodeposit may be, if impurities exist in the die casting, embrittlement of the metal was certain to occur. He also stated that if the metal was perfect, the quality of plating must also be such that the life of the work would be uniform. He found in a test in which high grade metal was used and a definite thickness was put on by several different platers, that some corroded within six days while others stood several months. He felt that this indicated that the quality of plating is not uniform and therefore, if the plater is to meet specifications, he must not only see that the required weight of metal is deposited, but that it is put on by methods that are under control if there are to be no rejections.

Some Problems in Technical Control of Nickel Plating Production, by F. A. Maurer, Edison General Electric Company, Ontario, Calif. This was a very complete story of the methods of polishing and electroplating electric irons. The polishing is done on full automatics and the number of wheels with different abrasives used were given. The process for cleaning and plating had been studied very carefully and the methods used were thoroughly explained.

Notes on the Analysis of Tin Plating Solutions, by M. R. Thompson, Bureau of Standards. Due to the unstable nature of tin salts, it is difficult to maintain an alkali tin solution in good condition, except by chemical analysis. Mr. Thompson endeavored to work out simple methods that could be used by the average plater. It was stated that although the methods were not absolutely accurate, they were sufficiently so for commercial work.

Spray Prevention by the Use of Fixed Oils in Chromium Plating, by Prof. F. C. Mathers, University of Indiana. In electroplating, chromium fumes are given off from the solutions. These fumes carry chromic acid which is very corrosive. A review was made of the different oils that had been suggested by previous investigators to be put upon the solution, decreasing as much as possible the development of fumes. It was shown that by placing a cover of "Sunfixoil" upon the chrome solution that the loss by spray or mist could be generally decreased. Dr. Mathers found that either fish oil or whale oil prevented entirely the loss of solution by mist or spray and therefore eliminated to a marked degree any health hazard. The film of these oils acts differently from that of any other oil that has been suggested and a froth is formed which thoroughly entraps and prevents the escape of spray or mist. Dr. Mathers also exhibited samples of electrodeposited bismuth, magnesium and aluminum. The latter will be explained in detail in a paper to be presented at the meeting of the Electrochemical Society at Chicago this fall.



W. S. BARROWS

Awarded First Prize for His Paper on Finishing Steel Products

Exposure and Accelerated Tests of Plated Coatings, by P. W. C. Strausser, A. E. S. Research Associate, Bureau of Standards, Washington, D. C. At the Bureau of Standards panels prepared in the same manner as for outdoor exposure tests were used for testing by some accelerated methods. This was to ascertain if there was any relation between the results obtained from outdoor exposure and those by accelerated tests. It was found that while there is a general trend with the probable life of a coating, it was not possible to indicate how long that life may be. The tests were made with ferroxyl paper, salt spray and intermittent immersion. The results from none of these three tests are comparable. It is felt that it

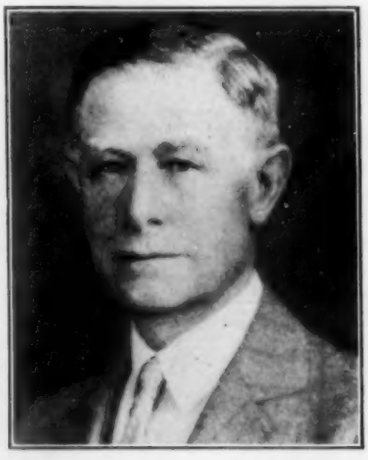
will be necessary to develop new methods for accelerated corrosion tests.

Notes on Cyanide Plating Solutions, by R. M. Wick, Bureau of Standards, Washington, D. C. Dr. Wick reported a year ago in a paper on Cyanide Solutions that some complex salts were formed. He gave in very careful detail the results of some very painstaking work which, although not of direct value to the electroplater at present, will be of inestimable value in any research on cyanide plating solutions.

Exhibits

The Kocour Company, Chicago, manufacturers of testing instruments and buffing compositions, exhibited their entire line at the convention. Besides the well known testing instruments, the new set for determining metallic copper in cyanide copper and brass solutions was demonstrated. A new pH comparator was also shown. Considerable interest was shown in the exhibit. Buffing compositions and samples of the raw material from which they are made also proved of of interest.

Aluminum Colors, Inc., of Indianapolis, Ind., whose trade name is "Alumilite" for the oxidizing and coloring of aluminum and its alloys, had a very interesting



PHILIP SIEVERING
Organizer of the Master Electroplaters Institute

exhibit of various aluminum articles manufactured by their licensees. The exhibit was in charge of L. R. Bailey, their service manager.

E. G. Sternberg, Foreman Plater, Crowe Name Plate & Manufacturing Company, Chicago, Illinois, had a very interesting exhibit of various finishes and etched work, including information on solutions and methods of finishing.

Final Business Session

Mr. Van Derau presided at the final business meeting held June 30th. The Auditing Committee reported a careful audit of the books and found that the Treasury and Research funds were correct.

Prize Awards—W. S. Barrows of the Toronto Branch received first prize for his article entitled "Finishing Steel Products by the Use of Sand Shavings, Soap Suds and Steel Balls," published in the April, 1933 Review.

E. G. Sternberg of the Chicago Branch received first prize for his exhibit of metal finishes displayed at the convention.

George B. Hogaboom presented the awards and complimented the winners highly for the interest they had taken in the Platers' Society. He hoped that in the future still more interest would be displayed. Mr. Hogaboom also stated that more recognition should be given to the excellence of the papers presented at the Chicago convention.

The Judiciary Committee reported that no changes in by-laws were presented for the Chicago convention.

It was decided that no gold medal award should be made for the year July, 1932-June, 1933.

Research Committee. Jacob Hay presented an interesting report on the Research work for the past year and hoped that for the coming year the committee would receive better support from the members of the Society and also from individuals and firms who are not members of the Society. Mr. Walter Fraine completed this report by reading off the receipts and expenses during the past year. Mr. Van Derau also made an interesting address on research affairs and hoped that enough funds would be available to continue the wonderful work carried on by the Research Bureau. A motion was carried to continue the research work for the ensuing year.

Election of Officers. Colonel Hansjosten of the Detroit Branch stated that he thought so much important work confronted them for the ensuing year that the present officers should be reelected for the year July, 1933-June, 1934. A motion was made and carried to reelect all officers.

Detroit the Convention City in 1934

Colonel Hansjosten then invited the American Electroplaters Society to hold their annual convention in Detroit in 1934. Detroit was chosen as the next convention city. Walter Fraine installed the officers for the ensuing year.

Job Plating Shops Organize

On Wednesday, June 28th, a meeting of the job plating shop representatives was held. The aims and objects of the proposed association are to formulate a code under which the job plating trade in the United States can work as an industry. It is hoped that this code will be presented to the administrators of the Industrial Recovery Act in Washington.

At a later meeting it was voted to call the body the Master Electroplaters Institute. The following officers were elected: **James Gerity, Jr.,** Toledo, Ohio, President; **E. J. Musick,** St. Louis, Mo., First Vice President; **H. C. Coombes,** Pasadena, Cal., Second Vice President; **James E. Nagle,** Toledo, Ohio, Secretary-Treasurer; **Philip Sievering,** New York City, Counsellor.

Job platers throughout the United States are requested to correspond with Philip Sievering, 199 Lafayette Street, New York. Additional information along these lines will be published in future issues of THE METAL INDUSTRY as fast as received.

Annual Banquet

The annual banquet was held Thursday evening in the Gold Room of the Congress Hotel. A group of fine entertainers held forth during the dinner. Afterward, there was dancing until one o'clock.

International Fellowship Club

The International Fellowship Club held its annual meeting and luncheon on Thursday, June 29th in the Hawaiian Room of the Congress Hotel. They were attended by the 40 manufacturers and sales representatives. The officers elected for the ensuing year are: **W. L. Cassell,** President; **T. B. Haddow,** Vice-President; **T. A. Trumbour,** Secretary.

Society for Testing Materials Meets

Summaries of Papers and Reports on Non-Ferrous Metals at the Annual Meeting in Chicago, June 26-30, 1933.

Report of Joint Research Committee of A.S.M.E. and A.S.T.M. on Effect of Temperature on the Properties of Metals. H. J. French, Chairman.

Committee activities and research studies carried on during the year. New tentative test methods for short-time and long-time tension (creep) tests at elevated temperatures.

Eighth Edgar Marburg Lecture: "Crystalline Structure in Relation to Failure of Metals Especially by Fatigue," by Dr. Herbert John Gough (see page 5).

The mechanical properties of metals in relation to their crystalline structure. The difficulties of deriving knowledge of the nature of the ultimate cohesive forces, analytically, from the results of tests on materials; the tendency of all atoms, even the most complex kinds, to group into regular assemblages; the mechanical properties of single crystals; the importance to fundamental theory of the elastic constants; an extensive investigation into the fatigue characteristics of single crystals; and X-ray evidence on the nature of hardening.

Fatigue Testing in Tension of Galvanized Wire: Effect of Initial Tensile Stress. S. M. Shelton and W. H. Swanger, U. S. Bureau of Standards.

Results of tests made to determine the limiting ranges of pulsating tensile stresses which permitted ten million applications of the pulsating stress without failure, at various values of mean tensile stress, on heat-treated and on cold-drawn galvanized steel wire 0.193 in. in diameter. The tests were made on the Haigh alternating stress testing machine set up to subject the specimens to tensile stresses only. A special device for gripping the specimens to eliminate fractures in the grips is described.

The Fatigue Properties of Light Metals and Alloys. R. L. Templin, Aluminum Company of America..

Various types of fatigue tests made on light metals and alloys describes the types of machines and apparatus used in tests made by the Aluminum Company of America. Also a new design of direct tension-compression fatigue machine and the high-speed vibrating-wire type. Fatigue data for nearly all the commercial light alloys of aluminum, both wrought and cast, for several magnesium-base alloys, as well as a discussion of the relation between endurance limit and tensile strength.

An "Overnight" Test for Determining Endurance Limit. H. F. Moore and H. B. Wishart, University of Illinois.

A method of determining fatigue of metals by subjecting specimens to 1,400,000 cycles of stress in a rotating-beam machine. The name "overnight" test is given this method since, on a 1500 r.p.m. machine, about 15 hours would be required to conduct the test, and a test could be started in the late afternoon and completed next morning. Data obtained by this test compared with data obtained by the usual long-time test.

Report of Committee E-4 on Metallography. C. H. Davis, Chairman.

Progress on revision of methods of metallographic testing of ferrous and non-ferrous metals and alloys.

Relative merits of Film and Paper for Industrial X-Ray Work. Ancil St. John and H. R. Isenburger, St. John X-Ray Service Corp.

Satisfactory Grades of X-ray film compared with satisfactory grades of X-ray paper with respect to speed, convenience, and cost.

Report of Committee B-3 on Corrosion of Non-Ferrous Metals and Alloys. T. S. Fuller, Chairman.

Extensive report of the atmospheric corrosion tests on 24 non-ferrous metals and alloys after an exposure of 1 year at nine test locations representing as many types of atmospheres. Status of other corrosion tests in the field including liquid corrosion tests and galvanic and electrolytic corrosion studies.

Corrosion Resistance of Structural Aluminum. E. H. Dix, Jr., Aluminum Company of America.

Results of comparative corrosion tests of structural aluminum and structural steel. The corrosion resistance of the structural aluminum is probably not sufficiently better than that of structural steel to justify recommendation that the structural aluminum can be used without paint protection under all conditions of exposure.

Report of Sectional Committee on Specifications for Zinc Coating of Iron and Steel. J. A. Capp, Chairman.

Revision of specifications for zinc (hot galvanized) coatings on structural steel products. Progress on specifications for zinc-coated (hot dip) hardware and fastenings, and of technical committees on pipe and fittings, and on methods of testing.

Round Table Discussion on Spectrographic Analysis:

1. Spectrographic Instrumentation—T. A. Wright, Technical Director and Secretary, Lucius Pitkin, Inc.
2. Accessory Uses of the Spectrograph—C. C. Nitchie, Bausch & Lomb Optical Company.
3. Methods of Quantitative Spectrography—O. S. Duffendack, University of Michigan.
4. Practical Application of the Spectrograph in Metallurgical Research—H. V. Churchill, Aluminum Company of America.

Report of Committee B-2 on Non-Ferrous Metals and Alloys. William Campbell, Chairman.

Recommends immediate adoption of the revisions of standard specifications for slab zinc (spelter) to cover special high-grade zinc. Recommends adoption as standard of tentative specifications for fire-refined copper other than lake and chemical analysis of silver solders. Editorial modifications in four standard methods. Test for determination of phosphorus in copper-base alloys. Completion of extensive revision

of methods of chemical analysis of aluminum and light aluminum alloys to be presented to Committee E-10 on Standards.

The Effect of the Addition of Lead on the Hardness of Certain Tin-Base Bearing Alloys at Elevated Temperatures. J. N. Kenyon, Columbia University.

Results of tests showing the effects of adding lead in quantities up to 14 per cent on the Brinell hardness of tin-base alloys at various temperatures. Heating apparatus used and the testing procedure followed in the paper.

A Comparison of Certain White Metal Bearing Alloys Particularly at Elevated Temperatures. C. E. Swartz and A. J. Phillips, American Smelting and Refining Co.

Data on white metal bearing alloys including Rockwell hardness at room temperature; microcharacter determinations of hardness of various phases in the alloys (room temperature); Brinell hardness at 75 F., 212F., 392 F., and 572 F.; compressive strength, elongation and reduction of area obtained over a range of temperature; and comparative service tests made upon two alloys using a motor block driving an electric generator.

Report of Committee B-5 on Copper and Copper Alloys, Cast and Wrought. C. H. Mathewson, chairman.

Recommends adoption as standard of tentative specifications for seamless copper tubing and for copper water tube. Advancement to standard of tentative revisions in specifications for copper plates, bars and boiler tubes; for copper and brass pipe; for admiralty metal, 70-30 brass and muntz metal condenser tubes; and for sheet high brass.

The Effect of Impurities, Iron and Sulphur, on the Physical Properties of Cast Red Brass (Cu 85, Sn 5, Zn 5, Pb 5). H. B. Gardner, Non-Ferrous Ingot Metal Institute, and C. M. Saeger, Jr., U. S. Bureau of Standards.

A continuation of the study on cast brass of the type 85-5-5-5, which was presented before the Society at the 1932 annual meeting. Properties of cast red brass as typified by two series of heats; one series contains sulfur as an impurity in progressively increasing amounts (maximum 0.10 per cent) and the other series contains iron up to a maximum of 0.6 per cent. Each heat is cast into a variety of different molds at several pouring temperatures and the mechanical properties, density and electrical conductivity are given. Data on the effect of these impurities on the shrinkage and running qualities of the metal.

Report of Committee B-4 on Electrical-Heating, Electrical-Resistance and Electrical-Furnace Alloys. Dean Harvey, Chairman.

Recommends adoption as standard of tentative method of test for thermoelectric power and tentative accelerated life test for metallic materials for electrical heating with revisions. Work on tests of wrought and cast alloys at high temperatures, life tests, and electrical tests. Progress on definitions and testing methods and apparatus for thermostatic metals.

Report of Committee B-6 on Die-Cast Metals and Alloys. H. A. Anderson, Chairman.

Revision of tentative specifications for aluminum- and zinc-base alloy die castings. Activities of subcommittees on tin- and lead-base die castings, on physical tests, and on finishing properties of die castings.

New Officers

President: T. R. LAWSON, Head, Department of Civil Engineering, Rensselaer Polytechnic Institute, Troy, N. Y.

Vice-President: HERMANN von SCHRENK, Consulting Timber Engineer, St. Louis Mo.

Members of Executive Committee:

FRANK A. BARBOUR, Consulting Hydraulic and Sanitary Engineer, Boston, Mass.

ARNO C. FIELDNER, Chief Engineer, Experiment Stations Division, U. S. Bureau of Mines, Washington, D. C.

C. N. FORREST, Representative, The Barber Asphalt Company, Philadelphia, Pa.

J. C. PEARSON, Director of Research, Lehigh Portland Cement Company, Allentown, Pa.

A. E. WHITE, Professor of Metallurgical Engineering, and Director, Department of Engineering Research, University of Michigan, Ann Arbor, Mich.

Retinning Coils

Q.—I have the problem of retinning the interior linings and tubular coils of milk and cream vats. The product to be coated is copper. The original tin coating is eaten away by the acids in the milk or cream or by the alkalis used in cleaning, the exposed copper surface creating a metallic flavor in the milk products.

I have been trying to work out a method of tinning this equipment without electricity or heat. I have heard of a product for this use that was painted on but I have never seen any of the product.

Can you advise me if a liquid preparation of tin or other metal that would not affect milk flavors could be developed that could be brushed, wiped or sprayed on the equipment? It is a very tedious job to remove coils and handle as is done at present.

A.—There are two or three methods that may be tried to coat these coils with tin. We would suggest that you get in touch with a metal spraying company for a spray pistol for coating with tin.

Then there is another method that perhaps might be used. It is to use a very finely powdered tin, size to go through a No. 40 mesh. A torch is used to heat the article or surface to be tinned. The powder is mixed with radiator flux and then applied with the torch. It is then wiped until the tin adheres. A little powdered solder may be used to get better adherence. It is powdered to the same size mesh.

The third method is the usual one of wiping the surface to be tinned with clean muriatic acid with a drop or so of nitric in it, and then applying zinc chloride flux and swabbing with liquid molten tin. We have heard of the liquid preparation of tin of which you speak, but have never seen any of it, nor have we heard where any of it can be obtained.

W. G. IMHOFF.

Foundrymen's Meeting Full of Interest

By H. M. ST. JOHN
Associate Editor

Lively Discussions Feature Good Non-Ferrous Sessions

THE 37th annual meeting of the American Foundrymen's Association was held at the Hotel Stevens in Chicago, June 20th to 23rd inclusive. Some sixty members of the Foundry Equipment Manufacturers' Association participated in the exhibit of foundry equipment and supplies, also held at the Hotel Stevens. The total registration at the convention itself was slightly in excess of 1400.

The late lamented Depression has evidently not dampened the foundryman's interest in technical and practical matters pertaining to his industry. The number and quality of papers presented at the various technical sessions were fully up to previous high standards and the attendance at these sessions was practically as large as at former meetings where the registration was much larger than on this occasion. Those who came attended with a serious purpose and in several instances overcrowded meeting rooms which had been selected with the expectation of a smaller attendance.

It must be admitted that the exhibition did not attract the usual throngs. This, of course, was largely due to the competitive effect of Chicago's Century of Progress Exposition but can also be attributed in part to a certain lack of novelty in the foundry exhibits themselves. A few exhibitors found themselves well repaid for the imagination and ingenuity employed in planning their displays.

New Officers

At the opening meeting on Tuesday, June 20th, those present were welcomed in a brief address by President Hammond who stated that his official address as A. F. A. president would be filed for publication later. Secretary Hoyt's report was read and accepted. At the annual meeting on Thursday, June 22nd, the following new officers were elected:

President: Frank J. Lanahan, President, Fort Pitt Malleable Iron Company, Pittsburgh.

Vice President: Dan M. Avey, Editor, "The Foundry," Cleveland.

Directors: George Batty, Technical Director, Steel Castings Development Bureau, Philadelphia.

James L. Wick, Jr., President, Falcon Bronze Company, Youngstown, Ohio.

R. J. Teetor, General Manager, Cadillac Malleable Iron Company, Cadillac, Mich.

Thomas S. Hammond, President, Whiting Corp., Harvey, Ill.

Dr. H. Ries, Professor of Geology, Cornell University, Ithaca, N. Y.

R. F. Harrington, Metallurgist, Hunt-Spiller Manufacturing Corporation, Boston.

A notable feature of the annual meeting was the presentation of the Joseph S. Seaman gold medal to Dr. G. H. Clamer. Dr. Clamer's long service in behalf of the A. F. A., as well as his achievements in the field of foundry metallurgy, made this year's selection for the Seaman medal a particularly happy one.

Although many of the customary features of "Foundrymen's Week" were omitted this year, the joint luncheon of the A. F. A. and the Foundry Equipment Manufacturers' Association was held as usual and was a most enjoyable gathering. Those present were much impressed by an address on "Business and Politics," delivered by Fred Sargent, President of the Chicago and Northwestern Railway.

JAMES L. WICK
Elected a Director of American Foundrymen's Association

Technical Sessions and Papers

Two technical sessions and a Round Table meeting were held by the Non-Ferrous Division. At the first session, under the chairmanship of Sam Tour, three papers were given, while the second, led by T. E. Kihlgren, assisted by John W. Bolton, G. H. Clamer and O. W. Ellis, took the form of a symposium on the deoxidation and degasification of bronze foundry alloys. H. M. St. John presided over the Round Table luncheon, which developed the usual variety of questions and answers, restricted somewhat more than ordinarily to practical rather than theoretical matters.

Following is a brief summary of the papers given with their discussion.

Harold J. Roast of McGill University delivered a paper on "A Practical Foundry Test on the Effect of Phosphorus, Aluminum and Silicon on Leaded Bronze." The alloys used contained 7 to 8 percent tin, 15 to 21 percent lead and about 2 percent zinc, balance copper. Various pouring temperatures and percentages of additions were tried. The addition of not more than 0.05 percent phosphorus was not found to be injurious, although as the proportion of phosphorus was increased, it was desirable to keep the

pouring temperature as low as possible. The addition of 0.05 percent aluminum resulted in the formation of dendrites and a discontinuous fracture. Silicon in the same proportion (0.05 percent) caused the castings to have a silvery white surface and either a segregated, dendritic fracture or a worm-like pitting on the surface; these two defects were not found in the same casting. The general conclusion was that aluminum and silicon must be kept out of alloys of this type.

"A Study of Six Bearing Bronzes," by Oscar E. Harder and Carter S. Cole, was presented by the latter. This paper described tests made at the Battelle Memorial Institute on bronze samples furnished by four co-operating companies, under the sponsorship of the Copper & Brass Research Association and the Non-Ferrous Bearing Metal Research Group. The alloys tested included the following compositions:

	1	2	3	4	5	6
Copper	80	88	83	85	70	70
Tin	10	10	7	5	10	5
Lead	10	0	7	9	20	25
Zinc	0	2	3	1	0	0

In each case the usual physical properties were determined, including also hardness and deformation by repeated pounding at somewhat elevated temperatures (350° F and 450° F) and the density of the metal after compression at 100,000 lbs. per sq. in. A good agreement was found between the properties of the same alloys as cast by the different foundries. In discussion the relative merits of steel-backed and bronze-backed bearings were outlined and a combination using both steel and bronze was described.

A paper entitled "Beryllium-Copper Castings—Foundry Practice, Heat Treatment, Properties," by Edwin F. Cone, consisted largely of a review of this new and interesting alloy, its properties and applications. Its response to heat treatment, producing thereby a metal which combines many of the favorable properties of non-ferrous alloys with those of steel, seems to promise a useful future for this alloy.

The symposium on deoxidation and degasification produced an animated discussion and much disagreement. The relative responsibility of carbon monoxide, charcoal, other solid forms of carbon, hydrocarbons resulting from the presence of oil, hydrogen emanating from water or otherwise, was thoroughly canvassed. The opinions of different speakers were so much at variance that it is impossible to summarize adequately the discussion in a brief space. Valve bronzes (85-5-5-5 type), leaded bearing bronzes (80-10-10 type) and tin bronzes (89-11 type) were scheduled for separate consideration but the discussion mixed them inextricably. In general there was a tendency to discard the conventional idea that "burned" metal is overoxidized and to lay more emphasis on troubles resulting from the reductions of impurities in contact with the metal and consequent contamination. But the various reducing agents which might possibly be responsible for this contamination had their ardent defenders and accusers. The discussion will be continued at a later meeting either by means of formal papers or another informal symposium.

Dr. O. W. Ellis contributed, in printed form, a theory with reference to the tin bronzes, based on the idea that capillary action within the casting may sometimes be responsible for the phenomenon known as "tin sweat." While a number disagreed with his conclusions, there was a general tendency to compliment Dr. Ellis on making a new approach to an old problem, mechanical in its character rather than chemical.

Among the papers given at other sessions, one by Harry W. Dietert and Frank Valtier, entitled "Grain Structure Control Insures Mold Permeability Control," is of great importance to non-ferrous as well as other foundrymen. The authors demonstrate that the fine material in a molding sand influences the permeability of the whole mixture out of all proportion to the amount of fine material present. For example: "When three sand grains from three adjacent sieves (in the A. F. A. standard) are mixed in equal proportions, the resulting base permeability will not be the average of the base permeability values for the various sand grains mixed, but much lower: approximately 66 percent of the average base permeability values." The importance of this lies in the fact that a sand seeming to have a desirable average grain size may be unfit to use because of a preponderance of fine material. This helps to explain certain unsuccessful experiences with methods for reclaiming used foundry sand.

Brass Founders Prepare to Organize

ONE of the most important activities at the Convention of the American Foundrymen's Association in Chicago, June 20-23, was the initiation of steps leading to the organization of a national brass foundry group which would work under the National Industrial Recovery Act. The directors of the Metropolitan Brass Founders Association, Inc., realizing the importance of getting their industry organized properly, sent a delegation of three men: William Ember, Jefferson Brass Foundry, Brooklyn, N. Y.; F. H. Landolt, Penn Brass and Bronze Works, Brooklyn, N. Y.; William E. Paulson, Thomas Paulson & Son, Inc., Brooklyn, N. Y.

On Friday, June 23, approximately 100 foundry executives met. The result of this meeting was the appointment of an organizing committee whose duty it was to prepare by-laws, district the country and otherwise suggest machinery for carrying on a national organization of the non-ferrous foundries. This committee consisted of five men, and in addition, N. K. B. Patch and J. L. Wick, Jr. The members of the committee are now at work and will meet again in Chicago on July 19th. Every foundry in the United States will receive a report of the organizing committee's work and copies of a complete set of by-laws will be included. If the trade decides to adopt their recommendations, a national organization may be perfected before the end of July.

It is imperative that every foundry wait for notice from the district representative on the central committee and accept his invitation to attend the meeting, which will be held in every district. **A good following is imperative now to start operations without delay.**

Melting Equipment in the Non-Ferrous Industry

By R. H. STONE

Chemical Engineer and Chairman, Technical Committee, Plumbago Crucible Association, in Collaboration With the Other Members of the Committee, K. E. Buck, H. P. Smith and H. E. White.

A Broad Consideration of all Types of Equipment for Various Needs. Factors Are Flexibility, Adaptability, Quality of Metal. Working Conditions and Costs — Part 3. Conclusion*

III. MELTING COSTS

Melting costs are seldom accurately segregated from the other foundry cost items because their principal interbe interested in such a narrow range of cost.

As the cost of melting is the most important item in the selection of melting equipment and as there was no uniformity or agreement in methods of figuring these costs it was necessary in preparing this paper to limit and itemize melting costs.

Melting costs as given here include the following items: (1) Thermal energy or fuel. (2) Labor. (3) Refractories, including lining and covers. (4) Crucibles for melting and carrying. (5) General Maintenance. (6) Auxiliaries, such as blowers and pumps. (7) Fixed charges, depreciation and interest on investment based on depreciated value.

Data on which costs are based should cover a reasonably long period, preferably a year, because production rates vary and, in fluctuating, raise or lower the per ton cost of some of the items such as interest and depreciation, electric power charges where current is bought under contract, and even labor cost per ton.

Melting costs should include all items up to actual pouring of the castings; otherwise it is easy to overlook such an item as crucibles for carrying or other pouring equipment which must be provided extra for all types except the lift-out crucible furnace where the melting vessel serves also for carrying. Cost analyses offered prospective purchasers of melting equipment sometimes are incomplete; thus, a recent analysis failed to include interest and depreciation on the investment which combined happened to be the third largest item for the equipment under consideration.

In considering the figures given in the following tables it should be borne in mind that conditions in two or more shops are seldom so nearly alike that absolutely relative costs for two different melting methods cannot be obtained. However enough additional data for each case is given in the descriptions following Table No. I so that the reader may fairly and accurately estimate their comparative worth.

Metal loss is given only in percent because of the difficulty in setting a value per pound on the loss due to the uncertainty of the composition of the lost metal and the fluctuations in the market price of the non-ferrous metals.

The examples given were chosen because these shops appeared to be efficiently operated and therefore represent what may be reasonably expected in performance and cost from the particular type of melting equipment employed. The tabulation of costs in Table No. I is followed by a description of each installation.

No. 1. Foundry of a Chicago valve manufacturing company. The analysis shows an oil consumption of 32 gals. per ton. There are doubtless many shops equalling, but few with a lower oil consumption than this. Four men, two melters, and two helpers, take out 80 heats per day, or 20 heats per man per day.

No. 2. Foundry manufacturing fittings. Note oil consumption twice that of No. 1 represents the upper limit in oil consumption with this type of melting equipment.

No. 3. Valve and fittings foundry using natural gas for fuel. While the fuel cost per ton is higher than for Nos. 1 and 2 using oil, the simplicity of using gas fuel, in a measure, offsets the difference in cost. Oil storage tanks are eliminated as well as pumps, strainers, etc. Metal loss of 1% is good practice.

No. 4. This installation is fully described in the September 15, 1931, issue of "Foundry." Of particular interest are the combustion arrangements accounting in part, at least, for the low fuel consumption—7,800 cu. ft. of natural gas per ton. The gas and air are mixed in proper proportion in the blower and the mixture admitted (without secondary air) to a cylindrical combustion chamber bolted on the side of the furnace and opening into the furnace itself. This device not only permits of more efficient use of gas but shortens the time required for melting and lengthens crucible life.

No. 5. A small jobbing foundry using coke fuel. The low cost for crucibles is a reflection of the average service obtained of 100 heats per crucible.

No. 6. Reported in full in Electrical World, January, 1932, where the claim is made that savings in melting costs with the electrical furnace were sufficient to retire the investment in two years. The electrical furnace replaced coke fired crucible furnaces and costs for the latter are also given, the total figure being $31.52 per ton. This includes a fuel charge of 1c. per lb. of metal indicating a fuel consumption of two tons of coke or coal at $10.00 per ton or, at the usual price of $5.00 per ton for coke, 4 tons of coke per ton of metal. Compare this figure as well as the labor cost of $9.26 per ton with example No. 5.

No. 7. Data taken from an article in "Foundry" February 1, 1928: Costs closely check those given in example No. 6 of the Table.

*Parts 1 and 2 were published in our May and June issues.

Table I. (Pouring cost is included where analysis number is asterisked.)

Analysis No.	1*	2*	3*	4	5*	6*	7*	8*	9	10
Type Furnace	Crucible-Pit	Crucible-Pit	Crucible-Pit	Crucible-Tilt'g	Crucible—Pit	Electric Indirect Arc	Electric Indirect Arc	Vertical Ring Induction	Open Flame Double Chamber	Open Flame Schwartz
Size and Number	18 No. 80	12 No. 60	12 No. 50	5 No. 125	5 No. 70	1-300 lbs.	2-350 lbs.	2-1000 lbs.	1-380 lbs. 3-570 lbs.	2-650 lbs.
Fuel	Oil, 18-20° Bé.	Oil, 28-32° Bé.	Natural Gas	Natural Gas	Coke @ $5.00	.....	Oil, Preheating	Oil, Preheating	Oil	Oil
Fuel Per Ton	31.68 Gal/T	63 Gal/T	10 M Cu Ft/T	7800 Cu. Ft/T	1200 lbs. per T	.....	.....	.....	205 Gal/T	78 Gal/T
Power	.....	.....	.....	.....	.....	2c K.W.Hr.	2.37 K.W.Hr.	2.13c K.W.Hr.	.....	.....
Power Per Ton	.....	.....	.....	.....	.....	324 K.W.Hr.	348 K.W.Hr.	300 K.W.Hr.	.....	.....
Metal	85-5-5-5	85-5-5-5	85-5-5-5	85-5-5-5	85-5-5-5	88-10-2	85-5-5-5	66-2.5-0.5-31	85-5-5-5	85-5-5-5
		80-6-10-4		78-2-7-13			Yellow Brass		80-10-10-0	
Investment	$7,000	$9,520	$4,900	$2,500	$800	$3,700	$13,000	$16,254	$11,200	$3,000
Output	3375 T/Yr	2220 T/Yr	2000 T/Yr	1382 T/Yr	500T/Yr	155 T/Yr	1200 T/Yr	1434 T/Yr	2000 T/Yr	450 T/Yr
Cost $'s Per Ton: Fuel	1.42	4.09	4.50	3.51	3.00	0.86	1.20	1.70	15.40	4.68
Power	....	....	....	....	....	6.51	8.25	6.39	....	0.01
Labor	1.99	2.28	3.29	1.52	3.85	3.60	2.38	3.35	7.72	0.82
Refractories	0.27	0.17	0.60	0.14	0.20	0.34	0.58	0.32	1.80	0.70
Crucibles	1.35	1.35	0.83	1.03	0.70	0.52	1.25	1.75	....	....
Electrodes	....	....	....	....	....	1.50	1.10	....	....	....
Gen. Maintenance	0.18	0.45	0.20	0.20	0.10	0.64	0.92	0.10	0.50	0.41
Interest	0.07	0.14	0.07	0.05	0.10	1.40	0.65	0.38	0.25	0.40
Depreciation	0.10	0.22	0.12	0.18	0.15	2.33	1.08	1.13	0.53	0.18
Auxiliaries	0.19	0.04	0.06	0.13	....	....	....	0.17	0.04	0.52
Total Cost	5.57	8.74	9.67	6.76	8.10	17.70	17.41	15.29	26.24	7.72
Metal Loss: Red Brass	2.75%	1.31%	1.00%	1.84%	2.00%	1.10%	1.00%	....	3.00%	2.50%
Yellow Brass	....	4.16%	....	1.94%	....	....	2.00%	1.00%	....	....

No. 8. Example of the vertical ring induction furnace costs in a plumbing specialty shop. Note, power rate is given at 2.13c. per K.W.Hr. This rate is obtained by dividing the monthly power bill by the consumption in K.W.Hrs. Of course, the more power used the lower the rate but the converse is also true and the extreme case would be when the plant might be shut down for a month and no power actually used but the stand-by or demand charges under the power contract still must be paid. These circumstances have led many plants to return to fuel fired types of melting equipment during the past year or two.

No. 9. Foundry producing automotive bearings and bushings; melting done in open flame furnaces of the double hearth type using oil fuel. As might be expected the fuel consumption is high and the metal loss large.

No. 10. Production shop using Schwartz open flame furnaces. Cost figures as of 1929; oil, at 6c. per gallon.

Table No. II shows the relationship between investment and capacities in the same ten cases given in Table No. I. Also capital charges are segregated and, with stand-by or demand charges for electric power added in, show the monthly charges in case of enforced idleness.

While in the above illustrations fuel type crucible furnaces seem to show the lowest costs the comparisons might be reversed where electricity is obtainable at low rates and fuel available only at high cost. Recently a series of articles on foundry practice appeared in one of the Journals. In the chapter on melting equipment the author claimed lower melting costs for non-crucible types of furnaces. Investigation revealed the costs were based on electric, indirect arc furnaces using electric power charge at ¾c. per K.W.Hr. as compared with crucible furnaces using artificial gas fuel of 750 B.T.U. content at 75c. per 1,000 cu. ft. Of course, under these circumstances the electric melting would probably be cheaper, at least for cost of fuel.

The melting costs compiled in Tables I and II are considered by the author to be representative and were selected from numerous cost studies. The averages of all these studies, grouped according to types of melting equipment, are as follows:

	Per Ton
Crucible Furnaces	$8.45
Electric Furnaces, Indirect arc	15.87
Electric Furnaces, Vertical Ring Induction	16.65
Open Flame	13.48

These average costs include the same items given in Table I and, therefore, do not include metal loss nor plant overhead and supervision.

Costs in Germany

Interesting cost figures on non-ferrous melting appeared recently in Germany.[3] The analyses compare melting costs using coke, oil, and gas fired tilting crucible furnaces and a low frequency induction furnace. While the individual items are mostly lower than the corresponding cost elements in this country the variations in the totals are in the same proportions as similar totals would be in America. These figures are shown in Table III.

[3]Die Giesserei, July 31, 1931. Melting in the Non-Ferrous Foundry, by Albert Kretzler.

Table II

Serial No. / Type Furnace	1 Crucible Pit Oil	2 Crucible Pit Oil	3 Crucible Pit Nat. Gas	4 Crucible Tilting	5 Crucible Pit Coke	6 Electric Indirect Arc	7 Electric Indirect Arc	8 Electric Vert. Ring Induction	9 Open Flame Oil	10 Open Flame Oil
No. of Furnaces	18	12	12	5	5	1	2	2	4	2
Cost per Furnace	$ 389	$ 785	$ 408	$ 500	$ 160	$ 3700	$ 6500	$ 8127	$ 2800	$1500
Total Investment	7000	9520	4900	2500	800	3700	13000	16254	11200	3000
Production T/Yr.	3375	2220	2000	1382	500	155	1200	1434	2000	450
Theoretical Cost of Installation to produce one Ton per Day	626	1286	689	543	482	7160	3250	3144	2366	2000
Capital Charges, Int. and Depreciation per Month	47.52	64.65	32.66	26.45	2.08	40.09	140.84	180.15	92.07	21.75
Electrical Demand Charges per Month (Estimated)	—	—	—	—	—	50.00	200.00	200.00	—	—
Total Continuing Charges—Idle Plant	47.52	64.65	32.66	26.45	2.08	90.09	340.84	380.15	92.07	21.75

Table III. Comparison of the Melting Cost per Ton of Brass Using Various Types of Fuels

Source of Thermal Energy	Cost of Installation	Int. and Dep.	Lining	Fuel	Wages	Electric Power Blowers	Crucibles	Tools and Supplies	Total	Metal Loss %
Coke	$720.00	0.19[1]	0.40	3.00	0.96	0.12	0.96	0.05	$5.68	3%
		0.39[2]							5.88	
Gas	875.00	0.24[1]	0.33	2.70	0.44	0.12	0.92	0.05	4.80	1.5%
		0.48[2]							5.04	
Oil	960.00	0.26[1]	0.33	2.82	0.44	0.12	0.92	0.05	4.94	1.5%
		0.52[2]							5.20	
Electric (induction)	3600.00	0.97[1]	0.73	3.36	0.61	—	—	0.05	5.72	1.0%
		1.94[2]							6.69	

[1] Annual melt 594 tons.
[2] Annual melt 297 tons.

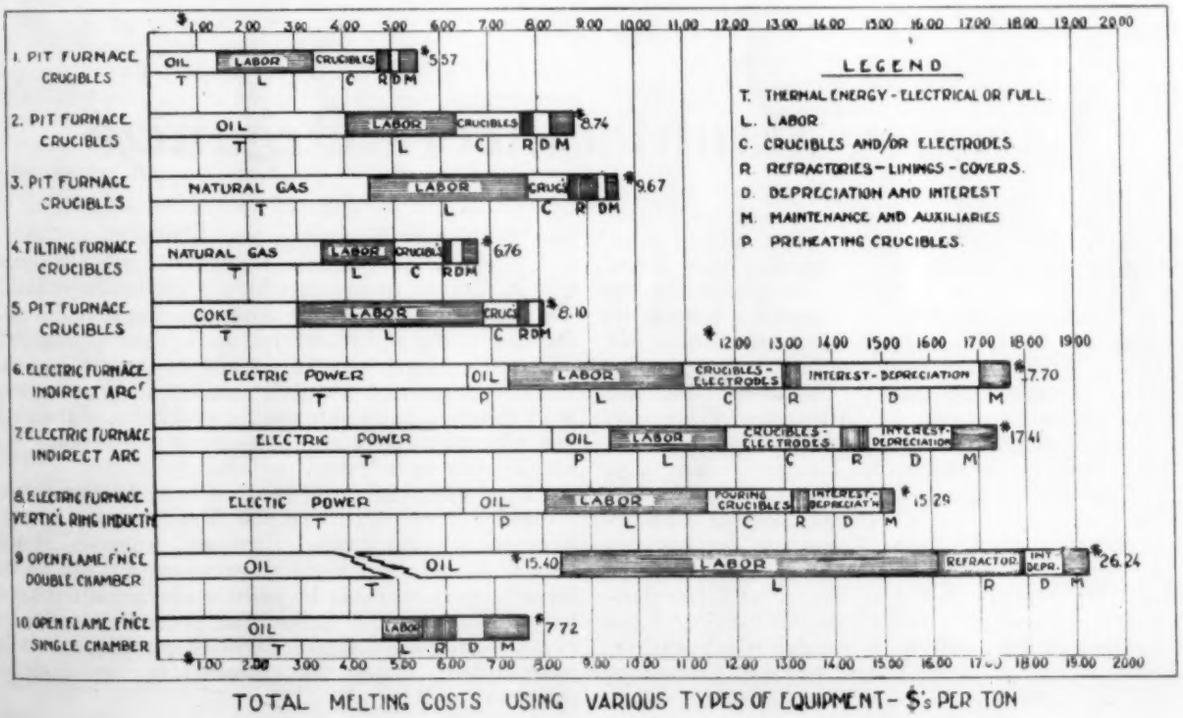
IV. CONCLUSION

It might be well to list briefly the various considerations governing the selection of melting equipment as has already been brought out in the foregoing sections. They are:

(1) **Flexibility** of the equipment and its ability to meet the shop conditions regarding number of alloys to be melted, fluctuations in the pounds of metal melted each day, and maximum and minimum weights of castings.

(2) **Adaptability** of the melting units to the fuels available; can it use another fuel if one source fails; can it be used for melting different types of charge, such as ingots, scrap and bulky turnings?

(3) **Quality of Metal.** It is pretty well established that good metal of almost any alloy can be melted in most of the types of furnaces although some require greater skill than others to obtain these results. Probably least trouble will be encountered with the types of furnaces that are the simplest in design and operation.



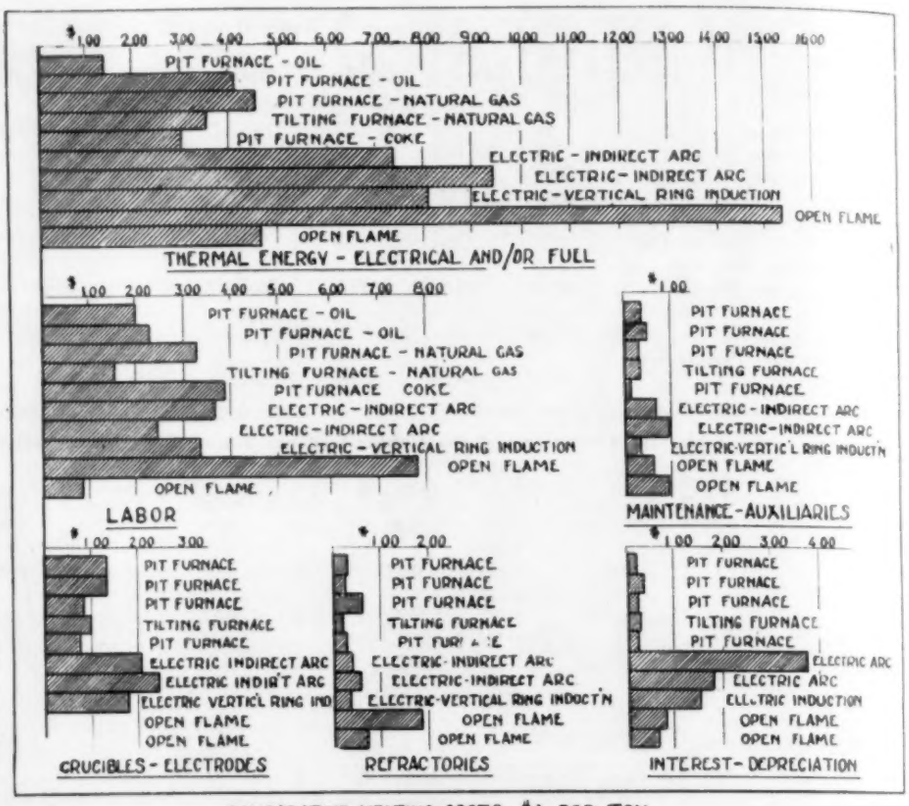
TOTAL MELTING COSTS USING VARIOUS TYPES OF EQUIPMENT - $'s PER TON

(4) **Working conditions** as affected by the furnaces have a very real economic importance on account of losses of metal in fumes and in labor turnover if the conditions are very disagreeable.

(5) **Costs.** It should be comparatively simple to analyze the cost of melting with each type of furnace even if each of the following items is only approximately correctly evaluated:

1. Fuel or power. 2. Labor. 3. Crucibles for melting or carrying, or both. 4. Refractories for linings and covers. 5. General maintenance. 6. Auxiliaries, such as pumps and blowers. 7. Fixed charges based on depreciation and interest on the investment.

Manifestly it is impossible to recommend a type of equipment as the best for all fields of non-ferrous melting. However, it is thought that the systematic application of the tests laid down in this review will enable any one interested in the commercial melting of the non-ferrous metals to select for his particular needs the best and most economical equipment available regardless of the interested representations and claims made for any one type.



COMPARATIVE MELTING COSTS - $'s PER TON

Lacquer Manufacturers Organize

FRANK G. BREYER of Singmaster and Breyer, Metallurgists and Chemical Engineers, New York, has been retained by the following companies to see what can be done to improve competitive conditions in the lacquer industry through organization under the National Industrial Recovery Act:

John L. Armitage Company, Atlantic Chemical Company, Atlantic Lacquer Manufacturing Company, Ault and Wiborg Varnish Works, Inc., Beckwith-Chandler Company, Brevolite Lacquer Company, Duralac Chemical Company, Egyptian Lacquer Manufacturing Company, Essex Chemical Company, Fiberloid Corporation, A. C. Horn Company, Impervious Varnish Company, Lacquer and Chemical Corporation, John W. Masury and Son, Mayer and Loewenstein, Nitrosol Company, Inc., Roxalin Flexible Lacquer Company, Inc., Monroe Sander Corporation, Standard Varnish Works, Valentine and Company, H. V. Walker Company, C. A. Willey Company, Maas and Waldstein Company, and The Zapon Company.

It is one of the essential features of this organization that it intends to represent truly the trade or industry for which it speaks. In other words, it is for manufacturers who are interested in lacquer primarily, because the larger existing trade organizations which include paint and varnish manufacturers are not so well able to concentrate on the problems of the lacquer manufacturers as a smaller, closer knit group with a single primary interest.

There are about 400 lacquer manufacturers in the United States. Of these 400, less than 100 are members of the National Paint and Varnish Manufacturers' Association, and half or more of these members have larger interests in paint and varnish than they have in lacquer. It is for that reason that the effort is made to bring together lacquer manufacturers in an independent group to concentrate on their own problems.

Electroplating Generators

CHARLES J. SCHWARZ
St. Louis, Mo.

A Series of Articles on the "Cornerstone of the Plating Plant"*

THE "corner stone of the plating plant" should be selected with due regard to the purposes and requirements of the plant itself. When 24 hours uninterrupted service is necessary to maintain the production of other units dependent upon the smooth functioning and operation of the plating plant, only the most reliable and dependable generating units can be used.

High speed is desirable for certain types of electric machinery—the turbo-generator, for instance; also, where the application permits the squirrel cage motor has a better efficiency and power factor at comparatively high speeds and the cost is less. Generally speaking, electrical machinery is cheaper, lighter and smaller at higher speeds, while retaining the desirable characteristics of dependability.

The low voltage generator is a notable exception to that rule. Large currents under low pressure necessitate the use of correspondingly large commutators on which a sufficient number of brushes commutate and collect the current without undue voltage drop and resistance.

A third loss is added. The brush friction which, comparatively insignificant at 250 or 600 volts, becomes conspicuous at 6 volts. The high friction loss, the wear and tear on the brushes and the commutators, should not be overlooked. The commutators, the brushes and the bearings are the only wearing parts in a low voltage generator.

Any generator running at normal speed excited to its normal voltage, say 6 volts, consumes practically the same amount of power whether delivering its full load in amperes or delivering zero amperes, to supply the following losses:

1. Bearing friction and windage.
2. Brush friction.
3. Armature core loss.
4. Exciting current.

The first three are direct functions of the speed, other things being equal. The fourth can be controlled so that the designer can give it practically any desirable value.

These four losses which can be measured with great accuracy, are constant, ever-present and substantially the same whether the generator is doing useful work or merely running idle. They are the overhead of the machine.

When current is drawn from a generator, additional losses that increase practically as the square of the amperes, are added to the constant or overhead losses. They depend on:

1. The resistance of the armature winding.
2. The resistance of the commutating pole and series winding, if any.
3. The resistance of the brushes, brush holders and bus bars to the terminals.
4. The resistance of the brush contact expressed in ohms.

All these resistances expressed in ohms multiplied by the square of the current drawn from the generator give the total watts of the variable losses. That these losses vary according to the amount of current drawn from the generator is evident, since the resistance is an integral part of the design and varies only slightly under temperature changes, whereas the current output varies from zero up.

Slow speed by itself insures:

1. Low bearing friction and windage.
2. Low brush friction.
3. Low wear and tear of the brushes, commutators and the bearings.
4. Low armature core loss.

While it does not necessarily insure high efficiency, low temperature rise and generous overload capacity, it at least indicates a disposition on the part of the designer to produce a high class machine by making the right start.

The ventilation of a slow speed machine is relatively poor; the losses which cause the heating must be kept down. More active material is necessary simply to obtain slow speed and still more material is needed to keep down the working values, the losses and the heating.

Therefore a slow speed generator will have greater overall dimensions and more weight than a higher speed machine of the same design. The commutators, the brushes and the brush rigging will be the same size and have lower losses because, regardless of the speed at which it revolves, the commutator will need a certain diameter and length to accommodate the necessary cross section of brushes which, everything being equal, will be the same at both speeds, except the friction loss which, of course, will be higher, the higher the speed.

The terms slow, moderate and high speed are relative. From the discussion of the slow speed generator we can deduce certain obvious facts about generators of high speed:

1. They will be cheaper.
2. They will be smaller in overall dimensions.
3. They will be lighter.

On the other hand we will have:

1. Higher bearing friction and windage.

*Part 1 was published in our June issue.

2. Higher brush friction.
3. Higher wear and tear of the brushes, commutators and bearings.
4. Higher armature core losses.

When the main purpose of the designer of high speed machines is to reduce the cost, overall dimensions and weight, it is to be expected that advantage will be taken of the better ventilating qualities to reduce the active material to the minimum amount necessary in order to keep the temperature rise within forty degrees.

Business conditions during the last few years have caused to be thrown on the market some excellent apparatus: also some less desirable. It must be borne in mind that great improvements have been made in the design and construction of generators and motor generator sets during the past few years.

The remarks about slow, moderate and high speed generators are fundamental and apply also to used machines. A fact often overlooked is that many generators were built and are still built for constant voltage and are not suitable where adjustable voltage is necessary.

The regulation of the modern commutating pole type generator driven by a synchronous motor is, as a rule, adequate to the requirements of chromium and almost any kind of plating. Used generators driven by squirrel cage motors are apt to have poor regulation.

The efficiency of some of these sets may be so low as to rule them out from continuous service. The manufacturer should be able to render valuable assistance to the prospective buyer of one of his second hand machines. He should be interested in the successful performance of his apparatus; he is in a position to give valuable information.

The methods of excitation impart to generators definite characteristics affecting their application. The next paper will take up the subject of self excited, series, shunt and compound wound; separately excited shunt and compound wound; commutating pole or interpole type generators.

This series will be continued in an early issue.—Ed.

Appraisal of Industrial Gas Fuel

By A. E. BLAKE

Mechanical Engineer*

This paper points out reliable means for establishing the comparative value of industrial gases. The sources of the principal gases are reviewed and outstanding applications for several of the common gases are mentioned.

A natural grouping into two classes of gases is shown and some of the general economic features are compared. Tables and discussion are used to compare common properties and show their relation to utilization.

The theoretical thermal efficiency for each industrial gas, and for each common combustible constituent has been plotted. Emphasis is placed upon the importance of the chart in gas appraisal, and an example is given.

The importance of net heat values as basis for comparison is stressed. Fallacies common in making comparisons are pointed out. A rational method of comparing two seemingly very dissimilar gases is illustrated.

The composition of flue products for quantitative oxidation (perfect combustion) of fuels is presented in tabular form with comment upon points of similarity and divergence.

Emphasis is given to the present common practice of attaining either "perfect combustion" or some constant, predetermined degree of CO_2 or CO concentration in furnace atmospheres.

*Abstract of an article in "Iron Age," May 25 and June 1, 1933.

Dental Gold

Q.—Can you advise us what the alloy is in 22-k gold that is used for bridges in dental work?

A.—Many different combinations of metals are being used to-day in dental work. Some of the 22-k golds contain only gold and a little copper, but many of them contain platinum or palladium, or both, either with or without a little copper. If the metal is springy, or of especial strength or hardness, or if it is subject to continuous strain or bending, the chances are that it contains platinum-group metals.

Two very important papers on "The Role of Platinum Metals in Dental Alloys" have appeared within the last few months. If you are interested, we suggest that you write to the American Institute of Mining and Metallurgical Engineers, 29 West 39th St., New York City, and ask them to send you reprints of articles on this subject, as presented by E. M. Wise and co-workers, in February 1932 and in February 1933. JEWELRY METALLURGIST

"Pickling" Aluminum

Q.—The writer is interested in producing home recording records made on aluminum.

It has been impossible in the past to use steel needles in playing these records. However, I understand there is a method of so hardening the aluminum after the record has been made so that it is possible to use a steel needle instead of fiber.

The method of hardening the aluminum has been described to me as a "pickling" process, which forms an oxide on the surface of the aluminum disc.

If you are familiar with the formula for such a "pickling" process would you please forward it to me. It was my belief that it might be an anodic treatment which was used, but I am not certain of this.

A.—You are probably correct in your assumption that aluminum is made hard by an anodic treatment. Your pickling idea is partly true as sulphuric acid is used to pickle and also to produce a hard coating on aluminum.

This process is patented and is controlled by Aluminum Colors, Inc., Indianapolis, Ind. They have 2 processes—a soft coating for coloring and a hard one for wear. Sulphuric acid is used for both. The current density is different.

It is not known whether the process is applicable to records. We would suggest that you write to Aluminum Colors, Inc., Indianapolis, Ind. Anyone can obtain copies of the patents.—G.B.H.

Developments in Metals

Fabricating Tungsten Wire

ROUGH cut diamonds set in brass casings form dies through which tungsten wire is drawn for the filaments of Westinghouse "Mazda" lamps. Tiny holes in the diamonds are made by placing the dies in revolving spindle blocks on automatic polishing machines, like that shown in the illustration, and points of ordinary stitching needles which have been dipped in fine diamond dust are placed at the point of the hole and held there by an oscillating rack that moves from side to side. By the revolving motion of the dies in the spindle blocks and the wigwagging of the needle rack from side to side, holes in the dies are rounded out in the shape of an hour glass. The diamond dust on the needle points acts as an abrasive and is the only thing hard enough to drill a hole through the diamonds. Some of these machines in the Westinghouse Lamp Company, Bloomfield, N. J., are equipped to drill holes so tiny they are almost invisible to the naked eye, and often filament wire is drawn through them that is several times as fine as human hair.

Tungsten filament wire is wound around brass or iron mandrel wire, and then subjected to an acid bath treatment which dissolves the mandrel without impairing or destroying the shape of the tungsten coils. On the machines which wind this wire the filament coils must pass microscopic inspection and above we see an operator in the Westinghouse Lamp Company, Bloomfield, N. J., keeping her eye on quality of the filament coils, all of which helps to keep American "Mazda" lamps the best incandescent light sources in the world.

Herbert Pendulum for Measuring Hardness of Metals.

The Herbert Pendulum—An Instrument for Measuring Hardness of Metals

RESEARCH engineers of the Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pa., determine the hardness of beryllium by means of a "Herbert Pendulum." The pendulum hardness tester is also used with thin sheets of metal, very brittle metals, case-hardened metals or other materials that cannot stand the rigors of hardness testing by the Brinnell or sceleroscope methods.

A tiny spherical steel ball, 1/25 inch in diameter, supports the heavy pendulum upon the test specimen. The spherical ball sinks farther into soft metals than hard metals, lessening the amount of the swing but increasing the time required for it. An air bubble in the curved tube on top of the pendulum indicates on the scale above the tube the extent of the pendulum's swing, and from this data the specimen's hardness is computed.

Left — Drilling Holes in Diamonds to Make Dies for Drawing Tungsten Filament Wire.

Right — Winding Tungsten Wire on Mandrels to Produce Coils for Lamp Filaments.

Photos, Courtesy Westinghouse Electric and Manufacturing Company.

EDITORIALS

The National Industrial Recovery Act

THE National Industrial Recovery Act has been passed and signed. It is now a law. Its purpose is "to encourage national industrial recovery, and to foster fair competition." The law and all the agencies established thereunder will cease to exist within two years after its signing or sooner, if the President by proclamation or Congress by public resolution, declares that the emergency is ended. It should be borne in mind, however, that there are many who believe that the emergency will not be over in two years, and that the Act will be continued

The President may approve codes of fair competition within trades drawn up by their associations; these codes to impose no inequitable restrictions on admissions to membership or be so designed as to permit monopolies. After approval, such code shall be standard for the trade, and violations render the offender subject to action by the Attorney General. In cases where codes are not brought to the President for approval, he may (of course, through his officers under this Act) prescribe a code for that trade.

If any trade members prove that articles are being imported into the United States under such conditions as to render ineffective the maintenance of their code, the President may direct that such articles be permitted entry into the United States only upon the payment of fees or limitations in the total quantity. In other words, he may raise tariffs, set quotas or bar the imports completely.

Moreover, if the President finds that a certain code is not being lived up to, that destructive wage or price-cutting is being carried on, he may license business enterprises in order to make the code effective and suspend or revoke the licenses of those who do not live up to the code.

It is prescribed that employees shall have the right to organize and bargain collectively through representatives of their own choosing. No one seeking employment shall be required to join a company union or to refrain from joining a labor organization.

So much for the high spots of the Act. The Administrator, General Johnson, is in charge. In addition, Secretary of Commerce Roper has appointed a Committee of 41 prominent business men to aid him. As we look over the list, we find only one, Edward T. Stannard, President of the Kennicott Copper Company, in any way related to the non-ferrous metal industries. Speaking for ourselves, it is regrettable that more metal men were not appointed.

We are not speaking out of turn when we say that the consensus of business opinion is that the bill is loaded with dynamite. Dynamite may be very useful and effective. It may also be completely destructive. In this case it depends upon everyone involved, the President, General Johnson, the Advisory Committee and to a great extent business men themselves.

The press is full of interviews, opinions and predictions as to how the Act will be administered. They are all guesses at best. It is impossible to predict the operation of a plan so revolutionary in character, so untried in the past. For the man in business, there is only one thing to do, however—to go ahead under the law and to co-operate with his industry in every possible way.

Developing New Products

NOTHING in the business world has been more evident during the past few years than the wisdom of a progressive attitude toward research, market development and sales activity. It has been proved again and again that there is an ever present necessity for keeping the business mind alert. This principle is illustrated clearly in an interesting article by J. D. Hayes, president of the New Jersey Zinc Company in a recent issue of the Executives Service Bulletin of the Metropolitan Life Insurance Company.

The story is told for example, of the development, improvement and cheapening of zinc sulphide from a dollar a pound laboratory product to a commercial material selling at one-eighth that figure, with a wide market. Zinc pigment has also been introduced into the paper industry to make possible a thinner paper with satisfactory qualities of appearance, opacity, etc. Zinc has made itself indispensable in the rubber compounding industry. It is now possible to produce an alloyed zinc which can be fabricated into a wide variety of forms, and of course, we have the outstanding example of a new outlet for zinc in the die casting industry, which has grown several fold because of the development of improved die casting alloys which have eliminated the old defects of warping and crumbling. Only about fifteen years ago tin and lead were the most prominent base metals for die casting, but they were to a large extent unsuitable for anything better than decorative work. It was found that zinc alloys had properties which made them suitable for industry, but they did not retain these properties in service. This was overcome by the use of high purity zinc and the addition of small amounts of magnesium.

The mere development of a technical material is not enough. Development must be followed by sales effort and sales effort by service to users, teaching them how to handle the new material. Sometimes it is necessary to go far afield with this service. For example, it has been necessary to teach users of die cast-

ings how they can be electroplated to make them more attractive to the general public.

A campaign of this kind is suitable, of course, not only for zinc but for any other material, but it calls for vision, courage and unremitting effort—to say nothing of money. Are there not many other alloys with similar possibilities?

Accidents in Foundries

THE foundry is known to be a hazardous industry. Nevertheless, there has been steady improvement in the past few years in its accident experience. Strangely enough the improvement did not continue in 1932. According to a bulletin of the National Safety Council, the frequency rate for all types of foundries rose 6% and the severity rate was up 14% in comparison with 1931. These increases occurred in a year when there was a sharp curtailment of operations in the industry. Although some other industries also experienced a rise, frequent reductions occurred in most of the industries so far analyzed. For the foundry industry as a whole, the frequency rate index rose from 40.3 to 42.8; the severity rate index from 41.5 to 47.5. It seems that the number of temporary disabilities accounts for most of the increase, but fatalities were also higher in proportion to hours worked.

The brass and aluminum foundries made very much the best records of any branch of the industry—9.16 for frequency and 1.13 for severity rates against 23.12 for frequency and 24.6 for severity rates of the industry as a whole.

An interesting point of the analysis is the fact that small units show higher frequencies but lower severities in injuries than the large units.

It is difficult to assign causes for the rise in accidents. Perhaps it was due to relaxed effort on the part of the management as a corollary of the sharp cutting of expenses. Perhaps foundries have been under-manned; perhaps inexperienced help has formed a larger proportion of the force. Perhaps, also a large part of the trouble has been due to relaxed effort on the part of the men due to lower morale in these trying times.

Whatever the reason may be, the facts point out the need for increased effort. In the event of a pick-up in business, it may be increasingly difficult to prevent accidents because of the changing character of the working force. Special care will be necessary.

Cutting Expenses

IT IS natural when business is low and remains low for some time, to cut down expenses. At first we drop the "frills". They may be good and useful but they are not "directly" productive. Then there are deeper cuts. Assistants go; executives catch the 5:34 instead of the 4.12 train home. Then investigation and research cease. Then "general" trade promotion and sales efforts such as institutional advertising, are dropped. Then direct specific advertising is dropped. Then—but then that business is close to its last gasp.

Some of the above measures are necessary; some may even be beneficial; some are undoubtedly excusable; some are suicidal. Without pointing out in detail which is which (we would rather not risk treading on toes!) let us point out that trade promotion work is one of the few factors in business which must never be dropped. Cut? Yes, in spots. Concentrate on the best lines and channels? Yes. But to stop advertising for example, is the next thing to discharging all the salesmen. It "saves" money—and it shuts off many dollars in business for every dollar it saves.

Men still change their buying habits. Competitors will continue to go after each others' business. No one can hold every account year after year; new ones must be added.

The rule still holds good that the greatest rewards go to the most active and energetic.

Plating Holds its Own

FOR some time past the plating trade has been increasingly aware of the competition offered by the "stainless" metals. A recent disclosure, however, throws some interesting light on this situation. In a paper read at the convention of the American Electroplaters' Society by Carl Hussner of the Chrysler Motors Corporation, a description was given of the efforts of the automobile industry to add to the life of electroplated die castings. There is a strong movement among the well organized and powerful manufacturing companies to raise the standard of their plated coatings. To this end they are spending large sums in research.

This is very definite evidence to the effect that electroplating is not being displaced by stainless metals. If it were being crowded out there would be no heavy expenditures to improve it. Money is not spent in a dying industry by forward-looking, wide-awake manufacturers. There is no question of the value of stainless metals—in their place. But neither is there any question of the decorative value of electroplated metal coatings. It rests with the plating industry to continue its efforts to make these plated coatings more and more resistant to corrosion as well as pleasing to the eye.

Plating Business Improving

REPORTS continue to come in from all directions to the effect that business is improving in the electroplating industry. During informal talks at the Electroplaters' Convention it was reported that the manufacturers and job shops have become much busier and that the electroplating supply houses providing materials and equipment have felt a decided uplift. Among the latter, some firms reported a 25% to 75% improvement in May, over April. We make no attempt at predictions, as conditions both in the United States and abroad are well known to be unsettled. There is no doubt, however, of improvement at this time.

Correspondence and Discussion

Extruding Copper Wire Rod

To the Editor of METAL INDUSTRY:

On page 57 of the Feb. issue of your publication appeared an article which dealt with rolling copper wire rod. In these lines reference is made to some remarks in the July issue of the Metal Industry, p. 284.

We find that one of your clients submitted to you the question whether the extrusion process is employed in making copper rods from ¼" to ⅜" in diameter. Your Mr. W. J. Pettis answered to the effect that "no extrusion for this type of work is being practiced."

This statement surprises us in view of the fact that you have published the article "Progress in Extruding Metals" by Dr. E. Pfann in June 1931 where it is expressly said that our extrusion presses are suitable for the manufacture of rods, sections, strip up to 14" wide, and wire in one or several strands having a minimum diameter of from ¼" to $\frac{5}{16}$". This is precisely an answer to the question asked by your customer.

Our hydraulic extrusion presses, which were advertised in your magazine in 1931 and 1932, are commonly and continuously used in a number of European countries for the production of copper rods, and readily extrude cast copper billets in one operation into strands of wire or rods of ¼" diameter. However, it is true that none of our extrusion presses installed in this country is used for the extrusion of copper rods and we assume, therefore, that this prompted Mr. Pettis to make the statement in question.

SCHLOEMANN ENGINEERING COMPANY
Pittsburgh, Pa.

In the article referred to dealing with the manufacture of copper rods, the writer confined himself to the practice established and used in the United States and had in mind the production of copper wire and rods only. Wire mills are in operation with a capacity as high as 50,000 lbs. per hour of copper wire ¼" diameter. Brass rods are produced in large quantities by the extrusion process, also copper shapes, an established practice in this country. Dealing with our client's question as a domestic one, the Schloemann Engineering Company is correct in assuming I answered on that basis.

W. J. PETTIS

New Books

Heat Treatment and Annealing of Aluminum and Its Alloys. By N. F. Budgen. Published by Chapman & Hall, Ltd., London, England. 341 pages. Price $7.50.

This book is exclusively devoted to the heat treatment of aluminum and its alloys. The subject is most important and anyone even slightly conversant with aluminum alloys is fully aware of the remarkable improvements in the mechanical properties of many of these light alloys which can be effected by heat treatment.

In recent years much research work has been carried out by metallurgists with conspicuous success, and with very beneficial results to the aluminum industry. The results of these researches, which have widely extended our knowledge of the mechanism of the changes which occur on heat treatment, and of the properties and characteristics of those aluminum alloys which respond to heat treatment, are disseminated throughout many technical and metallurgical magazines, and Dr. Budgen has performed a very useful service in collecting together in one volume the available information relating to the subject. This book is not a mere compilation, however, but a well-balanced and informative treatise which deals with both the theoretical and practical aspects of the subject thoroughly and with commendable accuracy.

The book is divided into four principal sections dealing with wrought pure aluminum, cast pure aluminum, wrought aluminum alloys and cast aluminum alloys, each of which is subdivided to cover heat treatment to anneal or soften, and to increase strength. Various theories of hardening are considered and the effects of thermal treatments on the physical properties are described in detail. Attention is also devoted to commercial methods for carrying out the heat treatment processes and the equipment which is required.

In addition to the systematic treatment of the subject in the text, which is well illustrated, a number of useful appendices are included, covering such subjects as the preparation of hardened alloys, the influence of heat treatment upon corrosion embrittlement, mechanical properties of aluminum and aluminum alloys at elevated temperatures, and aluminum bronze and its heat treatment. A comprehensive bibliography is also appended.

The book can be thoroughly recommended to those interested in the production and uses of modern aluminum alloys as a most reliable and informative treatise.—A. E.

Technical Papers

Year Book of the American Bureau of Metal Statistics. 1932. 33 Rector Street, New York. Price, $2. Thirteenth annual issue of this compilation covering all available figures on all nonferrous metals, including precious. Gives world figures of production, consumption, foreign trade, prices, per capita consumption, and various other data. This is the most complete and authoritative source of this information.

Recent Developments in the Preparation and Uses of Thallium. By James C. Munch, Ph. D., Temple University, Philadelphia, Pa. In "Foote-Prints," Vol. 6, No. 1, June, 1933, published by Foote Mineral Company, Inc., 16th and Summer Streets, Philadelphia, Pa.

Accidental Injury Rates in the Foundry and Metal Products Industries, 1932. National Safety Council, Inc., 20 North Wacker Drive, Chicago, Ill. Separate pamphlets giving accident statistics on these two branches of metal working.

New Taxes and Tax Law Changes Under the National Industrial Recovery Act. The Merchants' Association of New York, 233 Broadway, New York. Price, 25 cents. An analysis of the tax provisions of the Act, in the form of a pamphlet by Laurence Arnold Tanzer, tax expert and chairman of the Association's Committee on Taxation and Public Revenue.

Government Publications

United States Government publications are available from the Superintendent of Documents, Government Printing Office, Washington, D. C., to whom proper remittance should be made to cover price where a charge is mentioned. In some cases, as indicated, apply to governmental body responsible for publication.

Grinding Wheels. (Fourth Edition). Bureau of Standards. Simplified Practice Recommendation R45-32, issued 1933. 5 cents.

Dental Cone-Socket Mirrors. Bureau of Standards. Simplified Practice Recommendation R137-32, issued 1933. 5 cents.

Copper Industry in 1932. Advance Summary. Bureau of Mines, Department of Commerce, Washington, D. C. No. M.M.S. 203.

Shop Problems

This Department Will Answer Questions Relating to Shop Practice.

ASSOCIATE EDITORS

Metallurgical, Foundry, Rolling Mill, Mechanical

H. M. ST. JOHN
W. J. REARDON
W. J. PETTIS
W. B. FRANCIS

Electroplating, Polishing, and Metal Finishing

O. J. SIZELOVE
G. B. HOGABOOM
A. K. GRAHAM, Ph.D.
WALTER FRAINE

Barrel Nickel

Q.—We are enclosing two nickel plated articles. Please tell us the thickness of nickel on this work, and also how to make up a solution suitable to plate such work in a barrel.

The nickel should be bright when finished, and should produce the same thickness of plate as on the enclosed samples, in one-half to one hour.

A.—The thickness of the deposit on the sample submitted was 0.0005 inch. To produce this deposit in a barrel solution in one hour we would suggest that you use the following formula:

Double nickel salts	12 oz.
Single nickel salts	12 oz.
Boric acid	3 oz.
Sodium chloride	3 oz.
Water	1 gallon

Operate the solution at pH 5.8 to 6, and use 5 to 6 volts.

O. J. S., Problem 5,210.

Brass Plating Steel

Q.—We are contemplating doing some brass plating on steel for rubber adhesion. Can you give us the procedure for accomplishing this?

A.—The only requirements for brass plating is to have the work perfectly clean before plating, and to maintain a regulated temperature and current density. Formula for brass solution:

Copper cyanide	4 oz.
Zinc cyanide	1 oz.
Sodium cyanide	6 oz.
Carbonate soda	2 oz.
Water	1 gallon

Temperature 80° to 85° F. Cathode current density 2.5 to 3 amperes per square foot. Use rolled anodes, 80% copper, 20% zinc.

O. J. S., Problem 5,211.

Cleaning Barrel Work

Q.—As a subscriber of the METAL INDUSTRY I would appreciate your advice on how you would clean steel and brass articles in 100-lb. lots to be barrel plated (nickel).

Our work consists of screws, nuts, bolts, flat steel plates (they lie quite close together). In general, it is the average work that comes into a job shop for barrel plating.

We want to install some mechanical way of cleaning this class of work, either by rotating in a wire basket or a vertical up and down stroke in the alkaline solution, that is about a 10" stroke lifting out of the solution.

Which of these two methods would you consider the best?

What is the best cleaner to use for removing mineral oil before the alkaline cleaner is used? We are using a patent compound but it takes too long to evaporate and the oil or kerosene that it

USE THIS BLANK FOR SOLUTION ANALYSIS INFORMATION

Fill in all items if possible.

Date.....

Name and address: .....**Employed by:** .....

Kind of solution: .....**Volume used:** .....

Tank length: .....**width:** .....**Solution depth:** .....

Anode surface, sq. ft.:.....**Cathode surface, sq. ft:** .....

Distance between anode and cathode: .....**Kind of anodes:** .....

Class of work being plated: .....**Original formula of solution:**.....

REMARKS: Describe trouble completely. Give cleaning methods employed. Send small sample of work showing defect if possible.

Use separate sheet if necessary. _____

_____

_____

_____

NOTE: Before taking sample of solution, bring it to proper operating level with water; stir thoroughly; take sample in 2 or 3 oz. clean bottle; label bottle with name of solution and name of sender. PACK IT PROPERLY and mail to METAL INDUSTRY. 116 John Street, New York City.

contains is carried in our alkaline cleaner and sticks to the work when we take our work out of the alkaline solution.

A.—For cleaning such work as you mention, would suggest that the work be tumbled in sawdust to remove the greater part of the oil; then placed in baskets and use a vertical agitation of the work in an alkaline cleaning solution.

There are many cleaning compounds that are manufactured, and which one will work best depends upon the kind of oil you wish to remove. This is a problem for the cleaner manufacturers, and we would suggest that you consult the cleaner manufacturers who advertise in the METAL INDUSTRY.

O. J. S., Problem 5,212

Copper Plating

Q.—We have run into several peculiar conditions in connection with cyanide copper plating.

Our solutions analyze as follows: Copper metal content 3 to 3.5 oz. per gallon; free cyanide content 1½ to 2 oz. per gallon; carbonates 5 oz. per gallon. Temperature is maintained at 110° F.; voltage normally, 2 volts.

The condition referred to is a sort of streakiness which when buffed leaves a series of ridges; we get rough deposits and pitting. At times work plates nicely at 3 and 4 volts, while at other times, under the same plating conditions, the same work will burn very badly at 3 or 4 volts and must be plated at 2 volts.

Any light you can throw on the solution of these problems, or if you can refer the writer to any good treatise on the subject of cyanide copper plating baths, would be appreciated.

A.—From you analysis of the solution we are of the opinion that your trouble is due to improper anode or cathode current density. We do know that a cathode current density that is too high will cause this trouble.

We suggest that you have all anode and cathode connections cleaned, and, if possible, have an ammeter placed in circuit, and then you will be able to locate the trouble.

With the concentration of your solution, we recommend that it be operated at 1½ to 2 volts, and 4 to 6 amperes per square foot of cathode surface.

O. J. S., Problem 5,214

Nickel Analysis

Q.—We are sending herewith a sample of our nickel solution, of which we have 200 gallons in a tank, which is normally used at about 90° F. The nickel seems to be brittle and peels, and as we use it as under-plate for chromium, we should like to change it to a soft nickel solution. Kindly tell us what to add.

A.—Analysis of nickel solution:

Metallic nickel	1.87 oz.
Chlorides	0.78 oz.
pH	6.6

We suggest that you make the following additions to the 200 gallons of solution: 50 lb. single nickel salts; 20 lb. sodium chloride; 5 fluid oz. sulfuric acid; and 1 quart of 100 volume hydrogen peroxide. After the additions have been made, stir solution thoroughly and let stand over night before using.

O. J. S. Problem 5,214

Nickel Raises

Q.—We are having trouble with our nickel. It raises when chromium plated. We use trisodium phosphate and soda ash as a cleaner; electric cleaner; cyanide dip. The work is cast brass. We are sending sample of nickel solution.—D. B. Co.

A.—Analysis of nickel solution:

Metallic Nickel	2.64 oz.
chlorides	3.46 oz.
pH	5.2

The pH of the solution is too low. To correct the pH add 70 fluid ounces of 26° ammonia to the 430 gallons of solution. If this does not entirely overcome the trouble, it will be necessary to copper plate the brass casting for a few minutes in a warm cyanide copper solution before nickel plating. Your cleaning procedure is satisfactory, but a prepared cleaner is recommended instead of the one you are using.

O. J. S., Problem 5,215

Roman Gold

Q.—I have found that at nearly every shop they have a different view about the color of the so-called Roman Gold. Can you give me an idea what it really should look like as a standard?

Also, why should the copper carbonate and ammonia coloring solution fade from the original intense blue-black to various shades of brown and red? The high yellow brass was polished with a sewed buff and colored, made chemically clean and oxidized. There was at all times a surplus of carbonate, and ammonia was added as needed. Temperature, about 160 to 170° F. No trouble was encountered as to blackening quickly. Lacquered with a clear lacquer of good quality. After a couple of weeks the color began to fade.

A.—A roman gold finish has a satin or matt appearance. The finish may be produced by the sandblast, matt drip or satin brush wheels.

When the base metal is of brass, the finish is placed upon the metal, the work is bright dipped and then gold plated in a fine gold solution.

The trouble with the carbonate of copper and ammonia finish is due to the composition of the base metal. When high brass is used fading of the color is much more pronounced than when low brass is used. Brass with a lower composition of 80-20 should not be used.

O. J. S., Problem 5,216

Rough Copper and Nickel

Q.—I am sending you samples of a nickel and copper solution for a complete analysis. I would say, that my copper is plating very rough; it has been filtered. I am using electrolytic anodes, five inches from cathode; 120° F.

A.—Analysis of nickel solution:

Metallic nickel	3.79 ozs.
Chlorides	6.83 ozs.
ph	6.2

The chloride content of this solution is quite high. Do not add any more chlorides for some time. The pH is also too high and to correct this it will be necessary to add 2 fluid ozs. of sulfuric acid to each 100 gallons of solution.

Cyanide copper solution:

Metallic copper	3.84 ozs.
Free cyanide	2.25 ozs.

Both constituents of this solution are too great. Reduce the volume of the solution by one-third and then replenish with water.

O. J. S., Problem 5,217

Royal Copper

Q.—I desire some advice upon metal coloring as per enclosed sample. I have tried several methods of immersion bronze but results have been unsatisfactory. The original is for electric fire reflectors. It is mild sheet steel, cyanide and acid coppered. I have tried, in what I term Royal Copper, that is flash lead plated after acid coppering, then stoving at 250° C., but with no decent results.

A.—The sample submitted is termed a Royal Copper finish and is produced as follows:

After the acid copper deposit (which must be quite heavy) is polished, it is cleaned and flashed in a lead solution to produce a thin film of lead. It is dried and then immersed in a molten bath of sodium nitrate for a few seconds to produce a uniform oxide upon the surface. The temperature of the sodium nitrate bath should be 600° F., and as the work comes from the bath, it is dipped in hot water to dissolve any adhering sodium nitrate, dried and polished. The polishing operation brings out the even red color, and it should be carefully done.

O. J. S., Problem 5,218

Patents

A Review of Current Patents of Interest

Printed copies of patents can be obtained for 10 cents each from the Commissioner of Patents, Washington, D. C.

1,907,130. May 2, 1933. **Molding Apparatus.** David L. Summey, Waterbury, Conn.; The Colonial Trust Company and Richard P. Weeks Summey, executors of said David L. Summey, deceased.

1,907,219. May 2, 1933. **High Strength Hot Working Copper Nickel Zinc Alloy.** William W. Sieg, Bellefonte, Pa.

1,907,383. May 2, 1933. **Galvanizing Apparatus and Method.** Alfred H. Burnham, Jr., Columbus, Ohio, assignor to Locke Insulator Corporation, Baltimore, Md.

1,907,890. May 9, 1933. **Annealing and Coating a Base With a Metal.** Abram P. Steckel, Youngstown, Ohio, assignor to The Cold Metal Process Company, a Corporation of Ohio.

1,907,896. May 9, 1933. **Blocking Machine.** David L. Summey, Waterbury, Conn., assignor to Scovill Manufacturing Company, Waterbury, Conn.

1,907,907. May 9, 1933. **Method of Tapering Metallic Rods and the Like.** Theodore Varney, New York, N. Y., assignor to Aluminum Limited, Toronto, Ontario, Canada.

1,907,941. May 9, 1933. **Molding Apparatus.** Henry M. Ehmann, Akron, Ohio, assignor to The Akron Bronze & Aluminum Company, Akron, Ohio.

1,907,984. May 9, 1933. **Electrodeposition of Porcelain.** Hobart M. Kraner, Pittsburgh, Pa., assignor to Westinghouse Electric and Manufacturing Company, a Corporation of Pennsylvania.

1,908,023. May 9, 1933. **Aluminum Silicon Alloy.** Louis W. Kempf, Cleveland, Ohio., assignor to Aluminum Company of America, Pittsburgh, Pa.

1,908,029. May 9, 1933. **Grinding, Polishing or Buffing Machine.** Carl B. Larson, Maplewood, N. J., assignor to William C. Hammond, Kalamazoo, Mich.

1,908,032. May 9, 1933. **Gooseneck Operating Means for Die Casting Pumps.** William M. Lester, Shaker Heights, Ohio.

1,908,061. May 9, 1933. **Process of Applying Color to Metalized Articles.** Edward H. Schiffer, Meriden, Conn., assignor to The Rockwell Silver Company, Meriden, Conn.

1,908,079. May 9, 1933. **Refining Metal.** Gustave W. Thompson, Sayville, N. Y., assignor to National Lead Company, New York, N. Y.

1,908,222. May 9, 1933. **Brush for Electrolytic Use and Electrodes Therefor.** Frederick Conlin, New York, N. Y.

1,908,300. May 9, 1933. **Method of Removing Hard Spots from Aluminum-Silicon Alloys.** Robert S. Archer, Cleveland, Ohio, assignor to Aluminum Company of America, Pittsburgh, Pa.

1,908,597. May 9, 1933. **Tumbling Pickler.** John L. Gerber, Pittsburgh, Pa., assignor to Bronze Die Casting Company, Pittsburgh, Pa.

18,833. Reissue. May 16, 1933. **Process of Treating Aluminum.** Frank M. Clark, Pittsfield, Mass., assignor to General Electric Company, a Corporation of New York.

1,908,759. May 16, 1933. **Process of Carbonizing Metals.** Charles V. Iredell, East Orange, N. J., assignor to Westinghouse Lamp Company, a Corporation of Pennsylvania.

1,908,830. May 16, 1933. **Holder for Article to Be Electroplated.** Thomas A. Edison, West Orange, N. J., assignor to Thomas A. Edison, Incorporated, West Orange, N. J.

1,908,943. May 16, 1933. **Electrolytic Refining of Metal.** Frank L. Antisell, Wilkinsburg, Pa., assignor, by direct and mesne assignments, to Copperweld Steel Company, Glassport, Pa.

1,909,149. May 16, 1933. **Method of Preparing Articles for Plating.** Harry F. Hitner, Oakmont, Pa., assignor to Pittsburgh Plate Glass Company, a Corporation of Pennsylvania.

1,909,253. May 16, 1933. **Casting-Die.** Clyde E. Claus, Brooklyn, N. Y., assignor to Doehler Die-Casting Co., a Corporation of New York.

1,909,586. May 16, 1933. **Bronze Colors Polishing Machine.** Erwin Kramer, Berlin, Germany, assignor to Firm, Hartstoff-Metall Aktiengeesellschaft (Hametag), Berlin-Copenick, Germany.

1,909,716. May 16, 1933. **Method of Chromium Plating.** Walter L. Pinner, Detroit, Mich., assignor to General Spring Bumper Corporation, Detroit, Mich.

1,909,862. May 16, 1933. **Process of Attaching Metal Foil to a Surface.** Irving C. Honegger, Houston, Tex., assignor to Aluminum Company of America, Pittsburgh, Pa.

1,910,008. May 23, 1933. **Apparatus for Casting Zinc Slabs and the Like.** Daniel M. Gray and John J. Williams, Wheeling, W. Va., assignors to Hazel-Atlas Glass Co., Wheeling, W. Va.

1,910,017. May 23, 1933. **Electrolytic Extraction of Light Metals Contained in Alloys.** Paul Leon Hulin, Grenoble, France, assignor to Compagnie de Produits Chimiques et Electrometallurgiques Alais, Froges et Camargue, Paris, France.

1,910,145. May 23, 1933. **Electroplating Method.** William E. Belke, Chicago, Ill.

1,910,150. May 23, 1933. **Apparatus for Electrodeposition of Metals.** Sherard Osborn Cowper-Coles, Sunbury-on-Thames, England, assignor to F. C. Metal Processes Limited, London, England.

1,910,284. May 23, 1933. **Die Casting Machine.** William J. Fiegel and Winfield S. Enderich, Detroit, Mich., assignors to Bohn Aluminum & Brass Corporation, Detroit, Mich.

1,910,286. May 23, 1933. **Process for Recovering Metals Such as Tin, Lead, Antimony, or the Like.** Max Gerhard Freise, Angermund near Dusseldorf, Germany, assignor to American Lurgi Corporation, New York, N. Y.

1,910,366. May 23, 1933. **Method of Lead Coating Ferrous Alloys Containing a Relatively High Percentage of Chromium.** Louis L. Satler, Tarentum, Pa., assignor to Allegheny Steel Company, Brackenridge, Pa.

1,910,417. May 23, 1933. **Continuous Core Making Machine.** Merton W. Zeman, Lakewood, Ohio, assignor to The Osborn Manufacturing Company, Cleveland, Ohio.

1,910,431. May 23, 1933. **Magnesium Base Alloys.** John A. Gann and Fred L. Reynolds, Midland, Mich., assignors to The Dow Chemical Company, Midland, Mich.

1,910,432. May 23, 1933. **Magnesium Base Alloys.** John A. Gann and James B. Reid, Midland, Mich., assignors to The Dow Chemical Company, Midland, Mich.

1,910,446. May 23, 1933. **Melting Copper-Lead.** Robert D. Pike, Diablo, Calif., assignor to Kalif Corporation, Emeryville, Calif.

1,910,593. May 23, 1933. **Process of Forming Oxalate Coatings on Iron and Steel Articles.** Leo P. Curtin, Cranbury, N. J., assignor to The Western Union Telegraph Company, New York, N. Y.

1,910,656. May 23, 1933. **Production of an Aluminum Alloy.** David Ronald Tullis, Sutton Coldfield, and Percy Oakley, Liverpool, England.

1,910,861. May 23, 1933. **Aluminum Alloy.** Fred Keller and Charles M. Craighead, New Kensington, Pa. Original application filed Nov. 30, 1932, Serial No. 645,127.

1,911,023. May 23, 1933. **Method for Preventing Embrittlement of Copper.** Floyd C. Kelley, Schenectady, N. Y., assignor to General Electric Company.

1,911,077-083. May 23, 1933. **Aluminum Alloy.** Fred Keller and Charles Craighead, New Kensington, Pa., assignors to Aluminum Company of America, Pittsburgh, Pa.

1,911,122. May 23, 1933. **Process for the Electrodeposition of Aluminum from its Compounds.** Donald B. Keyes, Urbana, Thomas E. Phipps, Champaign, and Walter Klabunde, Chicago, Ill., assignors to Ellis-Foster Company, a Corporation of New Jersey.

Equipment

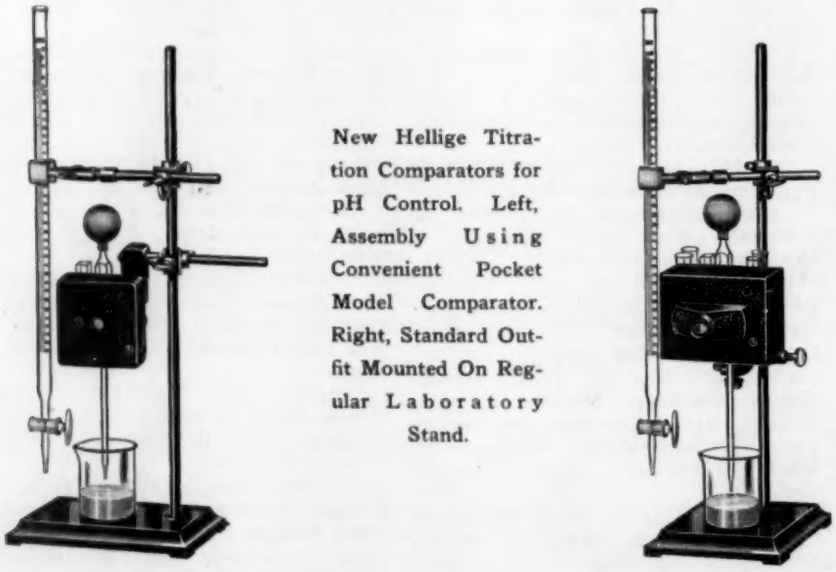
New and Useful Devices, Metals, Machinery and Supplies

New Titration Comparators for pH Control in Plating

The pH control is employed in the metal plating industry not only to determine the actual acidity of the bath, but also as a convenient means for adjusting the bath solution, if necessary to its optimum.

Hellige, Inc., 179 East 87th Street, New York City, has placed on the market two new titration comparators which are said to enable one to determine the amount of acid or alkali necessary to change the pH value of a solution to a definite other pH value in a much more simple, more convenient and rapid way than has been heretofore possible with electrometric outfits. The determination is similar to a regular colorimetric pH test with a Hellige comparator with the exception that a special pipette tube is used instead of the tube for the test solution with the added indicator. This enables the worker to draw the test material up into the special pipette tube and to repeat the color comparison in a convenient way until a color match with a certain standard is obtained, thus indicating that sufficient acid or alkali has been added. The test is made by placing a definite quantity (for example, 10 ml) of material to be tested into a small beaker, also a proper amount of indicator solution, and adding standard acid or alkali solution from a burette, the same as in the regular titration. The mixture is drawn up into the pipette tube by means of a rubber bulb and compared against the glass color standards in the color disc as in the regular pH determination. The color disc is set so that the standard for a certain pH value is seen in the color field. If not, sufficient acid or alkali is added in order to obtain a color match, the solution is forced back into the beaker and the titration repeated until a color match is obtained.

From the amount of standard acid or alkali solution added to the definite quantity of test solution in the beaker, it is a simple matter to calculate the amount of acid or alkali required to bring the total volume of material from which the test sample was taken, to the desired pH value.



New Hellige Titration Comparators for pH Control. Left, Assembly Using Convenient Pocket Model Comparator. Right, Standard Outfit Mounted On Regular Laboratory Stand.

Color discs for Hellige comparators with non-fading permanent glass color standards are supplied for all popular pH indicators within the range 0.6 to 13.6 pH and also for the determination of the metallic nickel content. Changing the apparatus for the metallic nickel determination is done in a few seconds, by opening the front door and exchanging color discs.

Metal Spray Equipment

A line of metal spray equipment is being made by the Metal Spray Company of Los Angeles, Calif. The spray gun weighs from 2½ to 4 pounds, and will handle any metal that can be drawn into wire. One interesting job done by this company was a large chromium plating tank which they sprayed with lead about two years ago. It is still holding up very satisfactorily.

Latest Products

Each month the new products or services announced by companies in the metal and finishing equipment, supply and allied lines will be given brief mention here. More extended notices may appear later on any or all of these. In the meantime, complete data can be obtained from the companies mentioned.

Oxweld Aluminum Flux. A new all-purpose aluminum welding flux intended to replace the two fluxes previously marketed, one for welding pure aluminum and the other for welding aluminum alloys. Linde Air Products Company, New York.

Dry Ice for Industrial Uses. Solid carbon dioxide used for such purposes as shrinking cores of machine parts before insertion into their housings, cold treating special alloys, etc. Michigan Alkali Company, Detroit, Mich.

Time Temperature and Time Pressure Controllers. Instruments for regulating temperature of pressure at some fixed rate, and then either holding it or decreasing it at some other rate. Bristol Company, Waterbury, Conn.

Etching Stainless Steel for Decorative Purposes. Two etched panels exhibited in the Travel and Transport Building at the Century of Progress Exposition in Chicago. Made of stainless clad steel by the Borg-Warner Corporation. The etchings are the products of the General Etching and Manufacturing Company, Chicago, Ill.

Bethanized Wire. A new type of zinc coating on wire said to be more ductile, tighter, tougher, more uniform and purer. This coating, it is claimed, can be made two or even three times as heavy as the maximum that can be applied by older processes. Various weights are supplied. Bethlehem Steel Company, Bethlehem, Pa.

Transverse Spray Coating Machine. A machine for automatically coating large, flat products, which will spray an average of 200 sq. ft. per minute. The machine is said to apply a more uniform coating at a higher speed than hand spraying. The DeVilbiss Company, Toledo, Ohio.

Black Lacquer Enamels

Maas and Waldstein Company, 438 Riverside Avenue, Newark, N. J., has placed on the market a new series of "Super Jet" black lacquer enamels for which it claims exceptionally black color, very high gloss, and freedom from haze. The company reports a very favorable reception by users of the new material, which is made in several grades for various kinds of metal work, and a special grade for wood. No dyes or toners are used.

Lectrovac Chemical Ware, A New Ceramic

An entirely new grade of chemical stoneware, known as "Lectrovac" Chemicalware has been developed by the Research Department of The United States Stoneware Company of Akron, Ohio, during the past two years. Its physical properties are said to be marked by remarkable increases in strength, resistance to thermal shock and mechanical impact, and it is confidently believed the new material will find numerous applications where chemical stoneware formerly was unsuitable. This new material was developed along the following lines:

1. During mixing, the clays are subjected to an electrolytic treatment and a further segregation of the impurities is made to take place in a shaded magnetic field of extremely high intensity. In the production of extruded shapes such as piping, pump liners and plungers, rolls, packing rings, etc., a new method was introduced known as modulated electric current through the clay body at the moment of its passage from the forming dies. This treatment gives a unifying and compacting effect.

2. "Lectrovac", furthermore, is made by the addition of new body constituents coupled with the introduction of a number of radical improvements over former processing methods.

3. De-airation of clays. Attempts to remove air from plastic clay bodies in order that they might be extruded through dies and formed into homogenous non-laminelar bodies free from blisters and cleavage planes, go back over a period of more than 40 years. It has only been in the past two years however, that machines capable of performing this operation on a continuous commercial scale have become available. Their use promises to revolutionize the quality of product produced by the heavy clay products industry. New de-airation equipment has eliminated the former difficulties such as the removal of excessive quantities of tempering fluids along with the air from the clay body.

Equipment and Supply Catalogs

Available free on application to the manufacturers mentioned, unless otherwise stated. Please mention this notice.

Furnaces. Ajax Electrothermic Corporation, Ajax Park, Trenton, N. J. Bulletin 8 on equipment for melting and heat treating. Illustrated.

Odor Filter. Consolidated Air Conditioning Company, 942 Chrysler Building, New York.

Monel Metal. International Nickel Company, Inc., 67 Wall Street, New York. Illustrated booklet on kitchen equipment.

Wire Cloth. International Nickel Company, Inc., 67 Wall Street, New York. Illustrated booklet on monel metal and nickel wire cloth for filtration and other purposes.

Motors. Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pa. Bulletin on "Thermoguard" self protecting motors for applications where overheating is a frequent danger.

Tin. International Tin Research and Development Council, Manfield House, 378 Strand, London, W. C. 2, England. 140-page bound book of world tin statistics. American representative of the Council is L. J. Tavener, Room 2810, 149 Broadway, New York.

Welding. The Linde Air Products Company, 30 East 42nd Street, New York. Bulletin on acetylene welding for general maintenance.

Prices versus Production, by Allen W. Rucker and N. W. Pickering, president, Farrel-Birmingham Company, Inc., Ansonia, Conn., who publish the booklet. It discusses volume as a factor in prosperity and some causes that retard volume production. An unusual analysis of the present situation is given.

Duozinc. R. & H. Chemicals Department, E. I. du Pont de Nemours & Co., Wilmington, Del. 48-page booklet describing a plating process and product for protection of steel against atmospheric corrosion. Gives description and process and anodes, telling their advantages, and contains comprehensive data on curbing steel corrosion by electrochemical methods. Preparation and operation of plating solutions; still and barrel plating; control and maintenance; cleaning; testing coatings; and other phases of the subject are discussed. Tables, graphs and formulas are included.

General Electric Company, Schenectady, N. Y., publications: Motor-starting Switches for fractional horsepower motors; Photoelectric Relay; Glyptal-Cloth Insulated Cable.

Cadmium Plating. Udylite Process Company, 3939 Bellevue Avenue, Detroit, Mich. Pamphlet entitled "More Than a Pound." Discusses the advantages of the Udylite cadmium plating process and supplies. A very readable and informative item.

Air Conditioning. Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pa. Illustrated 16-page bulletin describing equipment and applications.

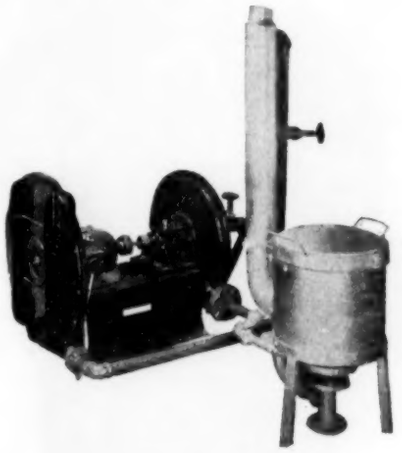
Humidity Recorder. Bristol Company, Waterbury, Conn. Bulletin 413 on humidographs, controllers, etc.

Pewter. National Lead Company, St. Louis, Mo. Sheet showing gauges, thicknesses and weights in ounces of pewter circles kept in stock.

High Temperature Furnace

A comparatively new type of furnace with unusually high heat producing qualities is being marketed by J. Goebel and Company, 95 Bedford street, New York. This furnace, called "Degussa 2000" which operates with gas as a fuel, can develop a temperature of almost 3,800 degrees F. The Goebel company has also developed a line of refractories for use in this furnace, which in some instances have stood up to 4,500 degrees F.

The furnace operates on the principle of surface combustion. The gases are not mixed before they are conducted to the furnace, and the resistance to the gases as they course through the furnace is at a minimum. Waste gases are used for pre-heating the air.



Degussa Gas Furnace

Gas and air are charged separately into a burner and are not mixed until they enter the combustion chamber, where they are ignited. This, it is claimed, eliminates the danger of back-firing. The flames do not enter the actual working chamber. This chamber is heated by radiation from the combustion chamber surrounding it. This it is stated, results in a more even distribution of temperature.

Crucibles are provided by J. Goebel and Company, made of refractories such as zirconium silicate, alumina, spinel, beryllium oxide, zirconia, magnesia and thorium oxide to stand the temperatures developed.

Improved Die Casting Machine

The Thomas Engineering Company of Wesleyville, Pa., recently took over the patents and good will of the business of the late R. E. Byrd, Erie, Pa., manufacturer of small die casting and slush casting machines. This business had been idle since the death of Mr. Byrd in December, 1930.

The Thomas company has perfected a 350-pound improved die casting machine which uses a die, 7" x 11", containing 195 cavities for small castings on a gate. This machine is designed to manufacture a wide

range of solid and slush castings. It is for use on Britannia metal and soft alloys only.

Repairs and upkeep, it is claimed, are almost negligible.

Turbine Ventilators

A special type of ventilator for use in general buildings, factories, manufacturing plants, etc., is made by the Allen Corporation, 14th Avenue and Howard Street, Detroit, Mich. This ventilator, called the Electro-Wind Turbine Ventilator, it is claimed, is not affected by wind direction,

Allen Turbine Ventilator

but rather assisted by any wind pressure regardless of the direction.

The chief thought in designing the Allen Electro-Wind Turbine Ventilator was to provide for a piece of equipment that would not have the objections of the ventilator with auxiliary fan, for this type of system builds a pressure under the head which cuts down the fan efficiency and increases power consumption, and if the fan is not in operation, it constitutes a serious obstruction to the free flow of air. The Allen Electro-Wind Turbine Ventilator, it is claimed, maintains a constant negative pressure under the head and provides free flow of air at all times. It can be used at the exhaust end of ducts having a multiplicity of branch connections and openings. This application was never possible heretofore with the ordinary gravity type ventilator.

New Suede-like Finish

The tremendous popularity of suede and suede-like materials has led to the development of a new finish by The Zapon Company, Stamford, Connecticut, a subsidiary of Atlas Powder Company. It is known as Sprayed Izarine Finish. Formerly the covering of any article with suede or imitation suede meant cutting and pasting innumerable pieces and then laboriously mounting them. Now a suede-like finish can be given to any surface by merely spraying a unique enamel and an equally unique Izarine powder with an air gun.

The process, which is completely covered by patent application, is simple, but research covering many years was necessary before it was perfected. The problem was to formulate an enamel that would remain wet long enough to leave time for spraying on of the Izarine Powder and yet dry rapidly thereafter without the need of baking or other artificial forcing.

Manufacturers of a wide variety of articles, from compacts to caskets, and from toys to typewriters, are negotiating with The Zapon Company for licenses to use this new finish. For complete information on this finish address the company directly.

Buffer and Grinder

After considerable experimentation and more than a year of testing on production work, the United States Electrical Tool Company, Cincinnati, Ohio, is now offering its new Model 95 variable speed buffer, polisher and grinder. The new machine is said to solve an important problem in the finishing industry, particularly in the ever-increasing A. C. current districts.

Because of the standards in the plating industry, it has been desirable to use buffing speeds not available in directly connected units of A. C. of standard cycle. The new U. S. machine solves this problem by providing for selective gear drive, extremely simple in design, positive in action and exceptionally flexible in speed, the maker states. The ability of this machine to maintain efficient peripheral speed for any desired diameter wheel, eliminating all possible slippage, is said to reduce transmission costs to a minimum.

The new development is also obtainable as a grinder (Models 64 and 65), with the selective speed gears interlocked with speed lever in such manner as to make it impossible to run the

Composite gear drive of Model 95 "U. S." buffer, which provides four speeds from 2000 to 3000 r. p. m., or any range desired.

wheels at a dangerous rate of speed. The guards are adjusted for various wheel diameters and wheel wear. Models 64 and 65 are especially designed for heavy, continuous work.

Complete details of these machines may be secured from The United States Electrical Tool Company, Cincinnati, Ohio.

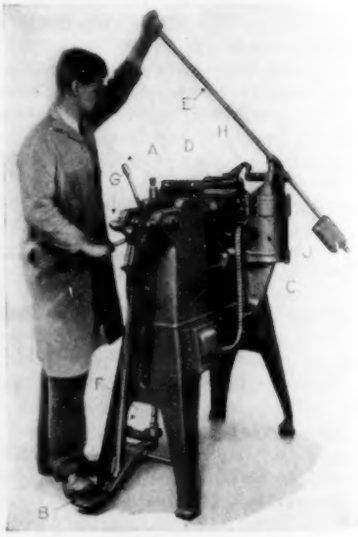
Low-Priced Die Caster

A new series of die casting machines in the low-priced class has been announced by Madison-Kipp Corporation of Madison, Wisconsin. These machines have been designed to meet the special requirements for the economical production of comparatively small parts.

These machines are particularly applicable for die casting parts which are now made by methods other than die casting. The new machine consists of:

Kipp-Caster No. 11 for the production of parts in aluminum, Duralumin, Nicralumin, magnesium and similar alloys.

Kipp-Caster No. 15 for the production of zinc, lead and tin alloy parts.



New Madison-Kipp Caster

Kipp-Caster No. 26 which is a combination of both Kipp-Caster No. 11 and Kipp-Caster No. 15.

Kipp-Caster No. 11 is an undershot machine (metal enters dies from the bottom at the parting line), having a metal well for hand loading and a hand-operated plunger mechanism for introducting metal into the die cavity under pressure.

Kipp-Caster No. 15 is a side shot machine (metal enters at the side of split-gate dies) and is equipped with an electrically heated metal pot and a plunger loaded metal pressure goose-neck. This machine is semi-automatic in operation.

The standard die size for the Kipp-Caster machine series is 6" x 6" x 3" thick, but this die size may be varied for certain types of castings. Special ram heads can be provided for odd-shaped dies; The "standard" die is obviously less expensive than the special and was established to include the widest range of castings for which the machines were designed.

Acquiring speed is a matter of familiarity with the cycle routine, which is accomplished in one movement of the right hand to close the die, which movement also rocks the metal pot into casting position; one movement of the right foot to lock the die and goose-neck; one movement of the left hand to pump the metal plunger; and a final movement of the left foot to unlock and open the die.

Personals

Adrian F. Wolff

A short time ago, Adrian F. Wolff retired from the position of mechanical superintendent of Scovill Manufacturing Company, Waterbury, Conn. He had been with the company for 65 years, and had established an enviable record of achievement in the brass fabrication field. The company's record of his association with it follows:

On St. Valentine's Day, 1868, Adrian F. Wolff, a boy of fourteen, entered the employ of the Scovill Manufacturing Company. In 1933, on the sixty-fifth anniversary of that date, he retired from a period of active service seldom equalled or approached in the industrial field. His tireless energy, initiative, leadership and mechanical skill, have left a lasting impress upon Scovill tool and machine methods and practices.

ADRIAN F. WOLFF

Sprung from a family famed for generations as makers of fine edged tools, he was born in Grand Fontaine, Lorraine, France, on July 1, 1853. In 1861, his father, Francis Ferdinand Wolff, came to the United States, settled in Bridgeport, and entered the employ of the Naugatuck and Housatonic Railway Companies. At the end of the Civil War he sent for his wife and three sons, Lucian, aged 14, Adrian, aged 12, and Alfred, aged 9. On January 15, 1866, the family settled in Waterbury, where the father and oldest son entered the employ of the Waterbury Farrell Foundry and Machine Company.

When Adrian went to Scovill's in 1868, there were but a few hundred employees. Before he left he saw its payroll reach a war-time peak of several thousands. He first worked for Silvain Dhéron, ornamenting buttons, combs and other brass articles, on the top floor of the old Button Shop near Mill Street, on the site now occupied by the hardening room. He then worked for a time in the thimble room, rolling, knurling and closing brass thimbles, an article still being produced by Scovill.

He entered the tool and machine department as an apprentice in 1871, and there started his long and invaluable service to that division. After his apprenticeship he displayed unusual promise as a journeyman, and in 1883 was appointed assistant foreman of the tool room, under Joseph Munger. Seven years later he succeeded to the foremanship. Within a short time his younger brother, Captain Alfred Wolff, who had come to Scovill in 1868, became his assistant. During the next twenty years Mr. Wolff's efficient re-organization of the mechanical departments won for him the post of mechanical superintendent, a position which brought out the full measure of his mechanical genius. The splendid record in munitions manufacture attained by Scovill during the Spanish-American and World Wars, as well as during peace times, was made possible by his careful planning and development of the mechanical phases of manufacture. One of his outstanding achievements was the development of an improved method of hot-forging brass, a notable accomplishment twenty-five years ago. The steady flow of cartridge case production with an unusually low percentage of rejections during the World War, is but a single example of results for which he was to a large degree responsible.

Since the War he has served as a consultant in mechanical engineering, and his opinions and advice have been most helpful in modern tool and machine development.

Obituaries

Thomas J. Shallue

A complete sketch has come to hand of the life of the late Thomas J. Shallue, who for many years up to his death last April was connected with the Bridgeport Brass Company, Bridgeport, Conn. (See our April issue, page 180.)

Mr. Shallue started in the brass business with the Scovill Manufacturing Company, working in various capacities. In the fall of 1888 he went to Bridgeport to accept a position with his father, as millwright. In this capacity, he assisted in setting up the Watts Campbell engine and installed the rolls in the Aluminum Brass and Copper Company. He remained in the sheet mill after completing his millwright work.

After the death of his father, Mr. Shallue accepted a position as foreman at Wallace and Sons in Waterbury. Mr. Shallue had always had a hobby of raising chickens in his spare time. In order to go into this hobby a little more strongly, he moved to Cheshire, where he became superintendent of the Cheshire Brass Company, and it was while he was with Cheshire Brass that Mr. Shallue and his brother invented and produced a lawn mower type of scrap cutter, many of which are now in use.

About 1903 he moved to Bridgeport to join Mr. Scanlan in the plumbing and tinning business. Later the call of the brass industry became strong again, and he became superintendent of a mill at Springfield, Mass.

At the outbreak of the World War, Mr. Shallue became night superintendent of the sheet rolling mill at the Bridgeport Brass Company. After the resignation of his brother, Mr. Shallue accepted the day position left vacant. His fairness and honesty made him well liked and appreciated by all his associates.

Mr. Shallue was in ill health for the past few years previous to his death.

Harry F. Seifert

Harry F. Seifert, superintendent of the foundry and micarta division of Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pa., died suddenly on May 22, 1933, while presenting a paper before the May meeting of the Pittsburgh Foundrymen's Association, of which he was a past president.

HARRY F. SEIFERT

Mr. Seifert was widely known in the foundry industry. After technical training in mining and metallurgical engineering at Columbia University, from which he graduated in 1906, Mr. Seifert went with the Nichols Copper Company, Laurel Hill, N. Y. After six years there he went to the Baltimore plant of the American Smelting and Refining Company, where he was in charge of anode casting for two years. He joined Westinghouse in 1916, going there originally to build a scrap copper reclaiming furnace. He has since done

considerable work in scrap metal reclamation.

The foundry industry knows Mr. Seifert as an authority on various metallurgical subjects. Active in association work, he was a member of the advisory committee, nonferrous division, American Foundrymen's Association; chairman of the subcommittee to formulate recommendations for nonferrous casting design; and a member of the recommended practices committee of the nonferrous division. At the time of his death he was a member of the executive committee of the Pittsburgh association.

Gerard Wayland-Smith

General suspension of the activities of the Oneida Community Ltd., Oneida, N. Y., was ordered on June 16, during the funeral of Gerard Wayland-Smith, director of sales and vice-president of the company. He died two days previously, following a year's illness. Mr. Wayland-Smith was born November 12, 1875. At 18 he joined the sales force of the Crucible Steel Company of America. In 1907 he joined Oneida, and succeeded in developing markets for the Community. He was made salesmanager in 1915, and nine years later, a vice-president. E. K. B.

David Belais

David Belais, prominent manufacturer of jewelers' supplies, who in 1917 developed white gold, died June 5, 1933, at his home in New York City. He was 70 years old.

At the time Mr. Belais developed his untarnishable white gold alloys, platinum was practically unobtainable, due to the war. The development is said to have been the result of 30 years of experimentation. When Mr. Belais finally put his alloy on the market it gained instant popularity and wide application in the jewelry trade. His name has been synonymous with white gold ever since.

Mr. Belais was at one time president of the Manufacturing Jewelers Association and of the 24 Karat Club in New York. He was also at one time chairman of the arbitration committee of the National Jewelers Board of Trade. Two years ago he retired from active business to conserve his health.

Herbert L. Lord

Herbert L. Lord, first vice-president and treasurer of the Detroit Lubricator Company, Detroit, Mich., died May 25, 1933. He was 57 years old. Mr. Lord was a graduate of Massachusetts Institute of Technology. He went to Chicago after graduation in 1898 to work for the American Radiator Company. In 1907 he became affiliated with Detroit Lubricator. F. J. H.

Antoine Lebrun

Antoine Lebrun, for more than thirty years foreman of the brass moulding department of the General Fire Extinguisher Company, Providence, died May 30, 1933 in his 67th year. He entered the employ of the company 46 years ago, and 13 years later became foreman. W. H. M.

News of Associations and Societies

Metal Finding Manufacturers' Association

Frederick A. Ballou, Jr., of B. A. Ballou & Co., Inc., was elected president of the Metal Finding Manufacturers' Association at the annual business meeting May 3, at Providence. Reports were presented by Edgar E. Baker, secretary and William G. Whytock, treasurer. The retiring president, Ralph Gregory, reviewed briefly the progress made by the association, and prophesied greater advancement under the incoming officers. The following were elected to assist President Ballou during the coming year: vice-president, Frank G. Perry, of George H. Fuller and Son; secretary, Edgar E. Baker of W. R. Cobb Company; treasurer, William G. Whytock, of Roland and Whytock. W. H. M.

Copper and Brass Research

The research committee of the Copper and Brass Research Association met at Rome, N. Y., May 27, to discuss technical advances in the industry. W. R. Webster, of American Brass Company, chairman of the committee, presided. Others present included W. H. Bassett of American Brass Company; D. K. Crampton of Chase Brass and Copper Company; W. B. Price of Scovill Manufacturing Company; R. A. Wilkins of Revere Copper and Brass, Inc.; H. Foster Bain of Copper and Brass Research Association; William H. Osborn of Phelps-Dodge Corporation; C. E. Williams of Batelle Memorial Institute.

Tin Research Committee

American Tin Trade Association has formed the United States Tin Research and Development Committee. Its purposes are: 1) to expand the use of tin; 2) to develop new uses; 3) to preserve and strengthen existing markets where tin meets competition. Members of the committee are: Chairman J. E. Pope, Pope Trading Corporation; A. B. Hall, National Lead Company; G. A. Biscaye, C. Tennant Sons and Company of New York; M. W. Tuthill, Tuthill and Company, Inc.; L. J. Tavenor, United States Representative on the International Tin Research and Development Council. To these will be added more members, including technical men representing research departments of tin interests, users, etc. Systematic accumulation of statistical, scientific and commercial data is planned in co-operation with the International Committee.

New England Jewelers

The New England Manufacturing Jewelers' and Silversmiths' Association met with representatives of the whole American Industry at Providence, R. I., last month, and discussed the adoption of a code under which the industry could be regulated in conformance with the National Industrial Recovery Act.

Waste Material Dealers

The twentieth annual convention of the National Association of Waste Material Dealers, Inc., embracing many divisions and affiliated associations, will be held at the Hotel Sherman, Chicago, August 7, 8 and 9. The program that was to have been carried out had the convention been held as originally scheduled in March, will be carried out at the August meetings, and in addition there will be the big problem of ways and means of fully cooperating with the government in applying and carrying out in the waste material industry the provisions of the National Industrial Recovery Act.

Piccard Uses Dowmetal for Balloon Gondola

Dowmetal, a magnesium alloy, will travel into the stratosphere when the Piccard ascent is made at the Chicago Fair. The metal, which is one-third lighter than aluminum, was chosen as the material for the gondola, a globe-shaped chamber seven feet in diameter, in which a small physical laboratory has been installed, together with control equipment for maintaining living conditions and controlling the balloon. Its outer shell is made of dowmetal plates one-eighth inch thick, welded together.

Industrial and Financial News

Jewelry Industry Organizes to Frame Code Under National Recovery Act

Edward O. Otis, Jr., executive secretary of the New England Manufacturing Jewelers' and Silversmiths' Association, announced on June 22 that a National Industrial Recovery Committee Sponsored by the Association has been formed for the purpose of organizing group committees, and ultimately framing a code of practice for the jewelry industry. The administrative body which would function as a regulatory board under the terms of the National Industrial Recovery Act, will be known as the Council of Manufacturers of Jewelry and Allied Products. This council is composed of divisional chairmen, and is provided over by a general chairman selected by the group.

Division chairmen will represent the various units of jewelry manufacture: platinum jewelry manufacturers, commercial chain makers, rolled gold platers, medium and low-priced jewelry makers, class pin and ring producers, refiners, jewelry findings manufacturers, and others. The Recovery Committee, comprising Stephen H. Garner, Lawrence E. Baue, Frederick A. Ballou, Jr., Edgar M. Docherty, Wallace D. Kenyon, Archibald Silverman, Harold E. Sweet and President James V. Toner and Executive Secretary Otis, Jr., of the Association, has been in conference with the administrative officials at Washington, and has formulated the plan of co-ordination along lines set down by the Government. The board of directors of the New England Manufacturing Jewelers' and Silversmiths' Association has approved the plan, and has appropriated sufficient funds to carry the organization to completion.

Several industry divisions have already begun to organize within the council, Mr. Otis has announced, and others are to be formed later as the plans develop. Under the terms of the plan each industrial division will be autonomous as far as its peculiar problems are concerned, Mr. Otis explained. They will be allowed to formulate divisional codes. These divisional codes will eventually, however, be merged into a single plan of regulation for the industry as a whole. Included in the regulatory plans will be those dealing with wages, hours of labor, conditions of labor, fair prices, competition and other matters.

Headquarters of the Association are at Providence, R. I.

W. H. M.

Business Items---Verified

American Brass Company has recalled over 100 employees to its plant at Buffalo, N. Y., according to a news dispatch. The company is reported to have had a large increase in orders.

R. E. Jones, operating the **Altoona Nickel and Copper Plating Works,** 2415 Union Avenue, rear, Altoona, Pa., has completed installation of a new chromium plating unit, which Mr. Jones says is the first in that city.

Ross Heater and Manufacturing Company, Inc., Buffalo, N. Y., has been acquired by **American Radiator and Standard Sanitary Corporation.** Ross company will continue as formerly but will be known as a division of the American Radiator company.

Lackner Company, Inc., Cincinnati, Ohio, electrical advertising specialists, says: "If several obstacles are overcome we expect to proceed with construction of our new building and will operate tinning, soldering, stamping and lacquering departments." **L. J. Coble** is an official.

Titan Metal Manufacturing Company, Bellefonte, Pa., manufacturer of brass rod and other products, is reporting operating some departments with two shifts, and has increased wages 5%, having previously reduced wages 20%. Company's business is said to be best in three years.

E. W. Bliss Company, machinery maker, will consolidate all operation at Toledo, Ohio, including engineering and principal sales offices, formerly at Brooklyn, N. Y. **Toledo Machine and Tool Company** there is a Bliss subsidiary. Branch sales office and complete repair shop will be retained at 53rd Street and First Avenue, Brooklyn, N. Y.

McDermid Incorporated, Waterbury, Conn., is now affiliated with **Udylite Process Company** of Detroit, and will act as sales agent for all Udylite cadmium plating supplies and equipment. McDermid, an old established electroplating equipment and supply firm, has made the new connection to provide improved cadmium plating service in New England.

E. F. Houghton and Company, Philadelphia, Pa., announces personnel changes as follows: **A. E. Carpenter,** formerly first vice-president and treasurer is now first vice-president and general manager; **George W. Pressell,** second vice-president, has resigned secretaryship and become assistant general manager and sales director; **Dr. R. H. Patch,** director of plants, is now treasurer; **A. E. Carpenter III,** assistant to general sales manager, is now secretary; **George S. Rogers,** formerly in charge of St. Louis and Chicago sales offices, is now general sales manager with headquarters at Philadelphia. The company's May sales were 24.5 per cent above May, 1932, and the highest in over a year.

Sentenced in Scrap Fraud

Samuel Ruderman of the Perth Amboy, (N. J.) Iron and Metal Company last month was sentenced to 3 years' hard labor for engaging in a conspiracy to defraud the Western Electric Company, Kearney, N. J., in the purchase of scrap metals by falsifying weights. The sentence was then suspended and Ruderman was placed on probation. His accomplice, formerly weightmaster at the Kearny plant, received suspended sentence. Both pleaded guilty of conspiring to underpay the electric company for scrap sold to the Perth Amboy Company.

New Corporations

Standard Brass and Manufacturing Company, Port Arthur, Texas; reincorporation for purpose of decreasing capital stock from $200,000 to $125,000. Company operates non-ferrous foundry, machine shop and rolling mill.

Russell Harrington Cutlery Company, Southbridge, Mass.; $250,000 capital; headed by J. C. Wells, president of American Optical Company, same place; and Ira Mosher, treasurer; J. A. Dickerman, general manager.

Paramount Metal Smelting Company, Inc., 3450 Richmond Street, Philadelphia, Pa.; $10,000; to acquire business of George L. Sall, reclaimer of white metals, who heads the new company with his brother, H. W. Sall. Negotiations are under way for new plant.

Payne Plumbing Fixtures Company, Cincinnati, Ohio, has been organized by T. F. and F. B. Payne, with $200,000 capital, to manufacture plumbing equipment and supplies. Contemplates installing monitor lathes and polishing, nickel and chromium plating department. Address care of E. D. Woodward, 414 Walnut Street, Cincinnati.

Keystone Valve and Manufacturing Corporation, Highfield, Md.; to manufacture flush valves and other metal products; is operating complete brass foundry and machine shop present capacity is 100 valves a day; officers: H. C. Bridgers, president; Col. J. J. Gibbons, vice-president; F. R. Moore, secretary and production manager; J. S. Hayden treasurer-general manager.

News From Metal Industry Correspondents

New England States

Waterbury, Connecticut

JULY 1, 1933

Waterbury factories continue to show improvement in business and employment, although these are still far below the levels of three years ago. Shipments are reported to be about 40 percent of the 1929 average.

American Brass Company, Chase Companies and **Scovill Manufacturing Company,** are operating most departments 5 or 5½ days a week. Chase last month shipped 600,000 articles to the **BeVier Corporation,** New York, for use in toilet kits of the reforestation corps. Chase is also said to have received a large order for metal tooth brush holders, soap boxes and shaving equipment for the reforestation corps.

Thinsheet Metals Company reports the volume of business to be about 100% larger than two months ago, and is working 5½ days a week. **Waterbury Rolling Mills** reports improved conditions and has increased hours to 40 a week. **Patent Button Company** finds great improvement in orders, and expects present conditions to last at least 60 days. Considerable improvement is noted by **Waterbury Farrel Foundry and Machine Company.**

Local brass company heads express approval of the proposed stabilization of the price of copper, stating it will help business materially. **John A. Coe,** president of American Brass, would not say at what price he thought it should be stabilized, but said it should be stabilized at a reasonable figure. **Edward O. Goss,** president of Scovill, expressed the belief that it would be inadvisable to stabilize it at too high a figure because it would mean large imports of foreign copper. It is possible that even 9 cents a pound would be too high, he said, because of the large amount of copper above ground.

Scovill Manufacturing Company secured passage by the legislature last month of a bill greatly increasing the powers of its charter. In addition to its authorized capital of $35,000,000, it is given power to increase its stock from time to time above that figure, and to change stock of one form, either common or preferred, to other forms and at different par value, provided the total aggregate capital values remain the same. It is also given power to issue stock with or without par value, and with such provision as to preference voting, powers, redemption and conversion as may be expressed by the vote of the stockholders creating them; to issue stock which may be converted into other classes and power to reduce its stock by reducing the number of shares.

A five percent increase in wages for the 2,000 or more employees of the **Waterbury Clock Company,** and the **Ingersoll-Waterbury Company** was announced last month, as partial restoration of cuts. **President James R. Sheldon,** announcing the increase, said it is an award to officials and employees for loyalty to the company during its difficulties, and that while it is not entirely free of financial troubles now, he feels all employees should share in the increase of business. One reason for the improvement he said, is exhibit at Chicago, where a special watch made by the company has been designated "Official World's Fair Watch." The company also has a miniature watch factory at the fair where visitors may purchase watches and see them made while they wait.

Application has been made by **James R. Sheldon,** receiver for **Beardsley & Wolcott Manufacturing Company,** to sell two small parts of the business for $20,000 and apply it on New York bank loans. The city has objected to the sale unless part of the sum is applied on the taxes owed by the company. **North and Judd Company,** New Britain, has offered to buy the so-called "spot" business and equipment therefor, and a California concern has offered to buy the razor strop business for $10,000. The court has not decided yet. The court awarded Mr. Sheldon $1,500 as part fee for his services as receiver, and authorized him to continue operation of the business for at least four more months.

Charles H. Granger, vice-president of **Waterbury Clock Company,** has patented a synchronous electric clock and assigned it to the company. **Samuel Andrew,** assignor to **Bristol Company,** has patented a golf ball holder. **Beardsley and Wolcott Company** has patented an electric heating device. **Carlton R. Stevens,** assignor to **Waterbury Brass Goods Corporation,** has patented a locking device for loose leaf note books.—W. R. B.

Connecticut Notes

JULY 1, 1933

BRIDGEPORT—Man hours worked in 30 local factories increased from 263,083 for the week ended April 15 to 337,476 the week ended May 15. The clearing house reports a 10% gain in payrolls. Payrolls at the **Bridgeport Brass** and **Remington Arms** are now the largest since the spring of 1932. The entire Bridgeport Brass plant is in operation, some departments on 5½ days and others on 4 days a week. **President Ralph E. Day** says: "There has been a substantial increase in the volume of our orders, and we shall continue to stagger our employment in order to take care of as many as possible."

Remington-Union Metallic Cartridge Company is working all departments on a 55-hour week, employing 1,600 hands. Business is exceptionally good, according to **Works Manager W. A. Tobler.** The purchase of 51% of the Remington stock by DuPont is understood to have been for cash. In addition, DuPont is said to have agreed to offer to Remington first preferred stockholders an opportunity to exchange their shares for an equal number of DuPont common shares. Capitalization of Remington consists of $4,244,800 of first preferred stock, $5,000,000 of second preferred stock and 641,885 shares of no par common. Remington has elected **C. K. Davis** president and general manager, succeeding **Saunders Norvell,** who resigned as president but remains a director.

General Electric Company officials discount reports that 4,000 workers are soon to return to the company's plants throughout the nation. **John W. Savage,** assistant to the vice-president, said: "Orders at the local plant have shown a considerable increase, and there has been an increase in the number of employees, but I know nothing of the report that 4,000 are being put back to work."

New machinery is being installed at the **Underwood Elliott Fisher** plant here, and production of Sunstrand machines is being brought here from Rockford, Ill. Employment will be given to about 200 by reason of this change.

HARTFORD — Arrow - Hart and Hegeman Electric Company has been directed by United States Circuit Court of Appeals to dispose of common stock of the **Arrow Electric** and **Hart and Hegeman** companies, acquired by merger in 1928. **President Edward R. Grier** says an appeal will be taken. The federal government brought suit four years ago on the ground that the merger was a violation of the anti-trust act.

Underwood Elliott Fisher Company's business the second quarter shows material improvement over the preceding quarter, and over the second quarter of 1932.

NEW BRITAIN—Twenty-one plants employing 10,880 men, added 221 employees during May, and the gain in the number of man hours per week per man over the previous month was 6. Man hours per month increased from 282,499 to 354,389, or 26.4%.

In several departments of the **Stanley Works** employees are working 55 hours a week, **Secretary Ernest W. Christ** says. Tools have been prepared and machinery production has been started on a line of structural toys. These may be used to produce replicas of prominent buildings, mechanical machines, etc. The sets sell at from $1 to $10.

Corbin Cabinet Lock Company divi-

sion of the **American Hardware Corporation** is engaged in experimental production of metal furniture for beer taverns and tea rooms.

BRISTOL—Man hours per month for 14 plants in Bristol during May amounted to 844,915, a gain of 66,426 or 8.5% over the previous month. Employees of **Wallace Barnes Company** have had restored to them the 15% in wages which was cut in March. Business during May was about 40% better than April, and orders last month showed about the same improvement over May. The plant is now operating five instead of four days a week, with a total force of about 600.

New Departure Manufacturing Company has increased wages 5%. The forging and automatic machine departments are being operated 18 hours daily with two shifts, and the entire plant is working from 40 to 50 hours weekly instead of 32. About 2,900 are employed. Salesmen, advertising and engineering officials of the company from all parts of the country attended a conference here last month.

E. Ingraham Company is working 36 to 45 hours weekly, and is behind on orders in a period when there is usually seasonal slump.

Veeder-Root, Inc., reports an improvement of 5% to 10% in business, and has increased hours somewhat.

TORRINGTON — Torrington Company declared its regular quarterly dividend of 50 cents a share, payable July 1 to stock of record June 16.

Martin D. Fitzgerald, assignor to the **Fitzgerald Manufacturing Company,** has patented a cylinder head gasket. **Elton C. Mayhew,** assignor to **Union Hardware Company,** has patented a fishing reel.

WINSTED—Winsted Insulated Wire Company organized in 1931 as successor to a concern of a similar name, is employing more operators than at any time since the reorganization.

Frank Hickey of Danbury has taken over the **Strand and Sweet Manufacturing Company** plant, and expects to start operations some time in August. A large number of local men have been engaged.

About 30 employees of the **William L. Gilbert Clock Company** left their work last month because the company refused to restore a former pay cut. All later returned when the concern agreed to restore it when conditions warrant. There are now 375 employees there, an increase of about 50 over that two months ago.

MIDDLETOWN — Middletown Silver Company is working 5½ days a week and has taken on a few more men. The **W. S. Miller Company** is operating six days a week. **Wilcox Crittenden Company** reports sales in May were 30% larger than April and 60% greater than March. It is working 4 to 5 days a week. **Lyman Gun Sight Company** has increased its force, and is working 5½ days a week, with several weeks' orders on hand.

TERRYVILLE—Eagle Lock Company is now working 8 hours a day in most of the departments which had been working only 4 to 6 hours daily. It announces that it will not close for the usual inventory period the first two weeks of July.

ANSONIA—A new schedule of 8 hours a day has been put in effect in the **American Brass** plant here. Employees are paid for a lunch period of 20 minutes, but must remain in the shop. Mills and casting shops are running 3 shifts daily.

THOMASTON—Seth Thomas Clock Company reports an increase in business. No successor to the late **Mason T. Adams,** vice-president and general manager, has been elected, and the vacancy in the board chairmanship caused by the death of **Seth Thomas, Jr.,** a year ago, remains unfilled.

WALLINGFORD—New York Insulated Wire Company plant here may be reopened by **Essex Wire Corporation,** the holding company, providing the town makes a reduction in tax assessments on the property. If this is done, back taxes will be paid up, it is reported.

COLLINSVILLE — Collins Company, manufacturer of tools, has increased working force 12% the last two months. It reports heavy orders from South and Central American countries.

Some departments are working 5½ days a week, and the general average is 40 hours a week. W. R. B.

Providence, R. I.

JULY 1, 1933

The end of the first half of 1933 finds all lines of industry more optimistic than in a long time. During May there was evidence of a pick up in several metal lines, and this has continued through June. Building has not shown much recovery, but tool and machinery plants have shown noticeable activity. In jewelry lines an improvement has also been noted. Several factories that were on short time or closed for many months have resumed operations, increasing hours and calling in some help.

Rhode Island payroll withdrawals in May gained 15.6 per cent over April and 3.5 per cent over May last year. This included practically every branch of the metal industries. This is the first time in almost four years that any month has shown withdrawals greater than in the corresponding month of the preceding year. The total payroll withdrawals for Rhode Island during May, 1933, amounted to $10,092,789 as compared with $8,731,857 in April. Included in the industries showing gains were machinery and hand tools; nonferrous metals; jewelry and silverware; iron and steel products; textile machinery.

Improved Pencil Company has filed reduction in capital stock from $100,000 to 100 shares no par common stock.

John R. Kershaw as agent for **T. R. Kershaw,** electroplater at 185 Eddy Street, has filed a voluntary petition in bankruptcy for the purpose of settling the estate. The liabilities are stated at $1,954 and the assets $3,244.

General Plate Company, Attleboro, has taken over patent rights assigned recently to **John A. Spencer** of Newtonville, Mass., for a thermostatic heater.

A marked increase in the number of contracts for bronze work received by the **Gorham Manufacturing Company** in the last few weeks has resulted in placing the operations of the bronze division of the concern on a full 24-hour a day schedule, and the volume of business now on the books is sufficient to maintain this rate for several months ahead, according to the announcement made a few days ago by **Edmund C. Mayo,** president.

Gorham, which is one of the largest silversmithing concerns, reports that the advanced price of silver has been responsible for a 40% appreciation in its inventories, which include approximately two million ounces acquired before the rise at 21 to 27 cents an ounce.

—W. H. M.

Middle Atlantic States

Newark, New Jersey

JULY 1, 1933

Several concerns in this section will enlarge their plants. **Metal Cone Manufacturing Company,** Jersey City, will erect a two-story brick addition to cost $40,000. **American Metal Bed Company,** Newark, has been incorporated; will build a small addition. **Fuchs and Long Manufacturing Company,** East Rutherford, has let a contract for a foundry building to cost $28,500.

A claim by **Radio Corporation of America** that **Arcturus Radio Tube Company,** is indebted to the corporation for $37,032.44 in patent royalties was presented to Circuit Judge Porter. Decision was reserved. It is claimed that there was an agreement by which Arcturus agreed to pay Radio 5 per cent on the tubes it sold.—C. A. L.

Trenton, New Jersey

JULY 1, 1933

Some of the metal plants in this section report that business shows some improvement, and that prospects are brighter.

The plant of the **Skillman Hardware Manufacturing Company,** was damaged by flames twice in one day recently. One blaze was caused by a furnace and the other started near the roof.

Exact Level and Tool Company, High Bridge, N. J., will build a tool manufacturing plant at that place, to cost $40,000.

Applicraft Corporation, West Orange, with capital of $25,000 will engage in manufacturing metal cutouts.

Electric Lamp Patents Corporation, Bloomfield, has been chartered to manufacture electric lamps.—C. A. L.

Central New York

JULY 1, 1933

Best conditions in three years were reported by Rome manufacturers during June, and executives look for even better business in coming months.

It was reported that the **Revere Copper and Brass** had added 225 men, and planned further increases in payroll. Revere reports a general increase in orders. Beer mugs and pitchers are bringing in good business. Revere also makes a line of kitchen and table utensils of solid copper with chromium lining.

General Cable Corporation, Rome, is adding to its payroll, and it was reported hourly rates had been slightly increased.

Business was said to be picking up slowly at **Spargo Wire Company,** Rome.

Rome Company, manufacturer of metal beds, reports good business.

Bossert Corporation, and **Foster Brothers,** both at Utica, are experiencing better business. Passage of the Industrial Recovery Act, a stimulus to the textile field, is expected to aid plants in Utica by purchase of new machinery.

The general survey of the metal trades group in Utica for May showed a decrease of 2.8% in employment but an increase of 4.8% in working hours.

Crediting him with four new features in his process for the commercial recovery of indium, **William S. Murray,** Utica, has been granted a patent on his method.

James B. Tourbert, salesmanager, typewriter division, **Remington Rand Inc.,** Ilion, completed 50 years' service with the organization in June.

Sale of **Triumph Trap Company, Inc.,** Oneida, to **W. A. Gibbs,** of Chester, Pa., was closed early in June for an unmentioned price. With this purchase the Gibbs interests claim undisputed first rank in the game trap field. The plant will remain in Oneida and make first shipments under the new business arrangement in September.—E. K. B.

New Mc Cord Product

Mc Cord Radiator and Manufacturing Company, Detroit, Mich., has developed a device to be used in connection with household refrigerators, and will engage the cooperation of its stock and bond holders in introducing the product, by sending them complimentary samples. The device will also shortly be advertised in connection with a nationally distributed electric refrigerator. Mc Cord has heretofore confined its efforts to automotive devices, but is starting to diversify production.

New Plant for Dam Cable

General Cable Corporation has begun construction of a new copper fabricating plant at Los Angeles, Calif., to turn out 8,570,000 feet of cable required in construction of transmission lines from Boulder Dam to Los Angeles, D. R. B. Palmer, vice-president of the company, announced last month. Sidney M. Smith will be plant manager.

Middle Western States

Detroit, Michigan

JULY 1, 1933

The National Industrial Recovery Act is the main topic of discussion in industrial groups here. Already movements are under way for a line-up under its provisions.

Improvement in the motor car industry extending over several weeks has furnished impetus to the metal industries. Accessory plants have maintained fairly active production to meet the demand. This activity may begin to taper off within the next few weeks, as has been the rule even in prosperous periods. But so far all the metals used in motor cars have seen activity considerably exceeding that of a year ago.

Production of plumbing and steam fitting supplies continues in its old quiet way, but the outlook is for early improvement.

Manufacture of refrigeration units is probably the most active industry in this area. Most of these plants are on quite pretentious schedules, with not much possibility of early reduction. Some of the refrigeration plants report difficulty obtaining supplies promptly.

With better conditions in the metal field, the plating industry also shows slight improvement, with prospects of considerably better things for the near future.

Bohn Aluminum and Brass Corporation has experienced a sharp up-turn in business since the beginning of April. It is gradually adding to its working forces. Two plants are reported operating on a 24-hour basis, one 18-hours a day, and another 12 hours, all five days a week. While the Bohnalite piston continues to be the biggest factor in the company's sales, it is not unlikely that the aluminum cylinder head, Bohn's latest product and now standard on Ford, Graham-Paige and optional on Hudson-Essex cars, is destined to become one of the company's leading products.

Final figures show **Kelvinator Corporation** in May shipped an average of 80 carloads of refrigerators daily from its Detroit plant, or about double the corresponding 1932 figures. May shipments totaled 43,357 units, a record high for any one month. A new high record also was set last month at the **Norge Corporation** plant in Muskegon Heights, Mich., it is stated by **H. Morley,** plant manager. Production of units in May, with a record number of about 1,300 employees, exceeded by 22% the company's previous record month. June schedule for manufacture of the new Norge washing machine has been increased 300 over May. The engineering department is working on other new products soon to be announced, it is stated.

McCord Radiator and Manufacturing Company reports a profit on April and May operations, and that a net profit will be shown for the first six months of 1933. This is a result of increased volume of production as well as reduction in costs. May business is reported as the largest since the same period in 1931.

Plymouth Motor Car Company has been forced to expand plant facilities, it is announced. This seems to be a unique procedure with motor car manufacturers, just at this time. The added facilities now permit production of more than 40,000 cars a month.

Hudson Motor Car sales are far ahead of last year.

Reports of increased production also come from the **Chrysler, Dodge, Ford** and **Buick.** F. J. H.

Cleveland, Ohio

JULY 1, 1933

This area, like other Great Lakes industrial centers, is experiencing a substantial improvement. This applies particularly to the metal fields. Cleveland manufacturers anticipate a "new deal" that should be decidedly uplifting.

The automobile industry has aided materially in boosting plant activity. This is expected to continue into the summer.

Plating plants also have increased operations but they could handle much more work.

At the annual meeting here of the Great Lakes Regional Advisory Board a short time ago, some of the delegates reported they had originally prepared discouraging statistics, but in a month the entire business picture had changed. **K. A. Moore,** chairman of the automobile committee, said he had expected to report a decrease in operations, but instead reported an increase. There has been not only a big increase in the manufacture of small cars, but also a satisfactory stimulus in output of higher priced models. Cars are being sold as fast as they are being turned out, he said. **H. E. McGivernon,** of Lansing, Mich., chairman of the automobile accessory committee, said there is every reason to believe substantial production will continue through July. F. J. H.

Chicago, Illinois

JULY 1, 1933

General upturn in the motor industry is shared by manufacturers in the Chicago trade territory. Metal consumers are building up inventories slightly in anticipation of increased business and higher raw material prices.

Diamond T Motor Car Company reports May sales were 100% better than May 1932. Total sales the first five months were 52% ahead of last year. **Auburn's** reports April and May sales were 26% ahead of the same 1932 period.

Chicago Motor Express Terminal Inc., notes a definite upturn, and Kee-

shin **Motor Express Company** has ordered a large quantity of raw materials to take care of additional business.

Bohn Aluminum and Brass Corporation expects net profits the first half of 1933 to approximate $550,000. Nearly 2,000 men are now employed, compared with half that number in January. Retail sales have been advancing steadily the past three months, May sales exceeding May, 1932. The increase is due to improved automobile business.

Chicago Electric Manufacturing Company's sales for May exceeded those of the entire first quarter. The concern makes electric household appliances and automotive lighting equipment; its inventory is now about 20% greater than it was Dec. 31, 1932, but will be built up further.

Bastian-Blessing Company has contracted to acquire certain assets of **Knight Soda Fountain Company,** manufacturers of soda fountain and beer equipment.

The gas range manufacturing division of the **American Gas Association** in convention here named a committee to work out an organization program to present to the government. **W. F. Roberts** of the Standard Gas Equipment Company, Baltimore, was chairman of the meeting at which 97 companies were represented.

Trackless Trolley Bus Corporation of America, 1 North La Salle Street, has been incorporated with $150,000 common stock. Louis E. Hart, Louis E. Hart, Jr., and W. Ward Smith are the incorporators.

Premier Refrigeration Sales and Service, Inc., 502 North Clark Street, will manufacture electric refrigerators and radios.

Equipment Manufacturing Company, 1827 South Michigan Avenue, will manufacture restaurant and store fixtures.

R. G. K.

Pacific States

Los Angeles, Calif.

JULY 1, 1933

Thermador Electric Company of Los Angeles and San Francisco has taken over the business of **Hoffman Specialty Company** and **Everhot Electric Company,** manufacturers of electric heaters.

Sharpe Manufacturing Company has moved to 1319 Maple Avenue, Los Angeles. Company makes portable air compressors, paint and insecticide spraying equipment, etc., for national distribution. **A. F. Sharpe** is president.

Yellowstone Water Heater Corporation, 1010 West 84th Place, Los Angeles, is manufacturing a new line of electrically welded water heating units.

General Machine Works, 3017 San Fernando Road, has erected a new building and installed equipment for making automatic coin-operated time switches.

Grecht Gold Leaf Company, 132 Tustin Avenue, Orange, Calif., owned by **Sam Harding** and **C. F. Bauman,** is steadily producing gold leaf. (There are only eight gold beating shops west of Chicago.)

Boeing Aeroplane Company, Seattle, Wash., is busy on a contract for new type of mail and passenger planes having a top speed of 175 miles per hour.

Barnett Sheet Metal and Welding Works has moved to 7824 Atlantic Avenue, Bell, Calif.

Alumaweld Company, Glendale, Calif., a division of Allied Research Company, has moved to 111 South Glendale Avenue.

Day and Night Water Heater Company, Monrovia, Calif., reports a world wide business in their solar heating plant line. **Dan McDonald** is the engineer.

C. P. Polson Welding and Manufacturing Company has bought a shop at 612 East Valley Boulevard, El Monte, Calif., and will produce a new type of citrus grove heater.

Elko Welding Works has removed to 3438 Slauson Avenue, Maywood, Calif.

Combined Machine Shop, 14th and F Streets, San Diego, has installed a complete welding shop. **H. O. Stevens** is manager; **M. L. Black** is in charge of welding.

L. J. Peters has removed his machine and welding shop to 1352 North State Street, San Diego.

Glendale Welding and Radiator Works, 735 San Fernando Road, Glendale, Calif., has erected a new building. **W. L. Heyn** is owner.

Bert T. Oxley has opened a welding shop at 8337 Atlantic Boulevard, Bell, Calif.

H. S.

Metal Market Review

Copper

JULY 1, 1933

The first week of June the copper market turned upward, and finally stabilized itself at 8.00c., delivered Connecticut, for electrolytic. Buying was moderate, with a fair amount of business for future delivery, extending as far as into the fourth quarter of 1933. Brass and bronze products were advanced accordingly.

The copper producers are giving serious thought to formulation of a code under the Industrial Recovery Bill.

Lead

After a few days early in June at 4.10c., New York, lead advanced ten points to 4.20c., New York, and held there through the end of the month. The strong tone of the market was doubtlessly due in part to the demand for metal which asserted itself all during the month. Sales for June shipment amounted to close to 30,000 tons, according to authorities, and sales for July shipment were placed at 34,500 tons, which on July 1 was already by far the highest monthly total since December, 1931.

Zinc

Beginning the month at 4.30c., to 4.35c., St. Louis, zinc moved upward slowly throughout the month, and ended up at 4.40c., to 4.45c., with the higher figure predominating in most transactions.

Most of the consumer business last month came from the galvanizers, who have been expanding their operations in line with the rest of the steel industry.

Tin

The price of tin fluctuated considerably during June, but ended the month between 4 and 7 cents a pound higher than on June 1. Straits tin was quoted as high as 47.00c., New York, towards the end of the month. The chief impetus to the tin business has been the expanding tin plate mill operations. Another point of consumption is beer distribution, in which a considerable amount of block tin pipe and tubing is required.

Other Metals

Aluminum — Prices remained unchanged throughout June. Business showed improvement, along with other metals. Continued research and development of new uses, and intensive promotional activity is steadily widening the market for aluminum and its alloys.

Antimony — The price remained steady throughout June at around 6.50c., for Chinese and American metal for spot delivery.

Bismuth—After holding for 18 months at 85c., per pound, bismuth was advanced to 90c., on June 27. The last previous price change had been made January 1, 1932, when it was lowered from $1 to 85c.

Precious Metals—Silver during June was subject to wide fluctuations as a result of speculative activity and this in turn was based largely on talk at the London conference affecting monetization. Silver debt payments also affected the market.

Scrap Metals—The various scrap and secondary metals were generally strong throughout June, and prices tended to follow, or even to anticipate, the strengthening in the new metals.

Tables of metal prices will be found on pages 264 and 265.

Brass Ingot Statistics

On June 1, unfilled orders for brass and bronze ingots and billets on the books of the members of the Non-Ferrous Ingot Metal Institute, Chicago, Ill., amounted to a total of 16,712 net tons, as compared with 16,408 on May 1.

The combined deliveries of brass and bronze ingots and billets by the members of the Institute for May amounted to 3,804 tons, as compared with 2,274 tons in April.

Average prices per pound received by the Institute members on commercial grades of six principal mixtures of ingot brass during the twenty-eight day period ending June 16, 1933, are as follows, with comparative prices, reported for the period ended May 19:

	28 Days Ended	
Commercial 80-10-10	June 16	May 19
(% Impurities	8.917c	7.299c
Commercial 78%	6.552c	5.902c
Commercial 81%	6.997c	6.034c
Commercial 83%	7.207c	6.278c
Commercial 85-5-5-5	7.684c	6.538c
Com. No. 1 yellow	6.217c	5.262c

Labor Code for Metal Men

Representatives of the Nonferrous Metal Ingot Institute, Aluminum Research Institute and National Association of Waste Material Dealers have been named to devise a labor code for submission to the Industrial Recovery Board. President Ivan Reitler of Federated Metals Corporation, New York, is chairman of the committee.

The Wrought Metal Market

JULY 5, 1933

The metal fabricating industries have been among the first to enjoy the benefits of the upturn in business. Whether or not the improvement which has been steadily gaining headway the past month is due to beer, the New Deal, the long period that ultimate consumers have held off buying new goods and replacements, the fact is that business in nearly all lines of metal products, from small hardware to automobiles, is on the "up and up".

The major fabricators of copper and brass products are increasing their schedules. The American Brass Company has been expanding its working forces at various plants, and is operating five or five and a half days a week in most departments. Scovill, Chase and numerous other companies are similarly increasing operations. Some increases in wages have also been made.

In the Great Lakes automobile manufacturing centers there has been a great improvement in plant operations.

Plumbers' brass goods makers and other users of raw and semi-fabricated metals report expanding operations and also some wage advances. Building construction has increased considerably, and that means more hardware of all kinds.

As for the uses of metals, the brewing and allied industries appear to be the seat of most new applications of metals, with aluminum coming in for considerable experimentation as a metal for brewing equipment and for distribution containers.

Anaconda reports that the Radio City project of the Rockefeller family in New York City thus far has taken 640,000 pounds of "85" red brass pipe for plumbing, heating and air conditioning systems. This company also reports that its development of very thin, wide copper sheet, made by electrodeposition, has proven successful and much of the material is going into roofing, for which the sheet is backed with asphalt material.

Fabricated metal products prices were advanced July 5, when copper went to 8½ cents. (See preceding section.)

The tin industry has formed an American organization to carry on research and development work with a view to expanding the uses of that metal. (See page 258). The brewing industry has opened up some good business in tin products. Tubing, sheet and other forms are being used in both the manufacturing and distributing ends of the business.

Daily Metal Prices for June, 1933

Record of Daily, Highest, Lowest and Average Prices and the Customs Duties

	1	2	5	6	7	8	9	12	13	14	15	16	19
Copper c/lb. Duty 4c/lb.													
Lake (Del. Conn.)	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
Electrolytic (Conn.)	8.00	7.875	7.875	7.875	7.825	7.875	7.875	7.875	7.75	7.875	7.75	7.75	7.75
Casting (f.o.b. ref.)	7.75	7.75	7.75	7.75	7.75	7.75	7.75	7.75	7.75	7.75	7.75	7.75	7.75
Zinc (f.o.b. East St. L.) c/lb. Duty 1¼c/lb.													
Prime Western	4.35	4.35	4.35	4.35	4.35	4.35	4.35	4.35	4.30	4.30	4.25	4.30	4.30
Brass Special	4.40	4.40	4.40	4.40	4.40	4.40	4.40	4.40	4.35	4.35	4.30	4.35	4.35
Tin (f.o.b. N.Y.) c/lb. Duty Free													
Straits	40.625	41.00	41.10	42.25	43.25	45.375	45.00	45.20	45.50	45.125	43.25	43.10	44.625
Pig 99%	37.125	37.50	37.60	38.75	39.75	41.625	41.50	41.125	41.50	41.25	39.375	39.25	40.875
Lead (f.o.b. St. L.) c/lb. Duty 2½c/lb.	3.95	3.95	3.95	3.95	3.95	3.95	4.05	4.05	4.05	4.05	4.05	4.05	4.05
Aluminum c/lb. Duty 4c/lb.	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30
Nickel c/lb. Duty 3c/lb.													
Electrolytic 99.9%	35	35	35	35	35	35	35	35	35	35	35	35	35
Shot (from remelted electrolytic)	36	36	36	36	36	36	36	36	36	36	36	36	36
Pellets 99.5-100%	40	40	40	40	40	40	40	40	40	40	40	40	40
Antimony (Ch. 99%) c/lb, Duty 2c/lb.	6.35	6.35	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50
Silver c/oz. Troy Duty Free	34.875	35.625	34.75	35.25	35.75	36.25	36.125	36.75	36.50	36.125	35.50	35.25	36.00
Platinum $/oz. Troy Duty Free	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00

	20	21	22	23	26	27	28	29	30	High	Low	Aver.
Copper c/lb. Duty 4c/lb.												
Lake (Del. Conn.)	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
Electrolytic (Conn.)	7.875	7.875	7.875	7.875	7.875	8.00	8.00	8.00	7.90	8.00	7.75	7.874
Casting (f.o.b ref.)	7.75	7.75	7.75	7.75	7.75	7.75	7.75	7.75	7.75	7.75	7.75	7.75
Zinc (f.o.b. East St. L.) c/lb. Duty 1¼c/lb.												
Prime Western	4.35	4.35	4.35	4.35	4.40	4.40	4.45	4.50	4.50	4.50	4.25	4.359
Brass Special	4.40	4.40	4.40	4.40	4.45	4.45	4.50	4.55	4.55	4.55	4.30	4.409
Tin (f.o.b. N.Y.) c/lb. Duty Free												
Straits	45.50	44.75	45.25	44.50	45.375	45.65	46.50	45.00	44.75	46.50	40.625	44.213
Pig 99%	41.875	41.50	41.875	41.25	42.00	42.75	43.50	42.00	42.125	43.50	37.125	40.732
Lead (f.o.b. St. L.) c/lb. Duty 2½c/lb.	4.05	4.05	4.05	4.05	4.05	4.05	4.05	4.05	4.05	4.05	3.95	4.477
Aluminum c/lb. Duty 4c/lb.	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30
Nickel c/lb. Duty 3c/lb.												
Electrolytic 99.9%	35	35	35	35	35	35	35	35	35	35	35	35
Shot (from remelted electrolytic)	36	36	36	36	36	36	36	36	36	36	36	36
Pellets 99.5-100%	40	40	40	40	40	40	40	40	40	40	40	40
Antimony (Ch. 99%) c/lb. Duty 2c/lb.	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.35	6.486
Silver c/oz. Troy Duty Free	36.00	35.00	35.75	34.875	35.125	36.25	36.25	35.625	35.75	36.75	34.75	35.699
Platinum $/oz. Troy Duty Free	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00

Metal Prices, July 5, 1933

(Import duties and taxes under U. S. Tariff Act of 1930, and Revenue Act of 1932)

NEW METALS

Copper: Lake, 8.625. Electrolytic, 8.50. Casting, 8.25.
Zinc: Prime Western, 4.60. Brass Special, 4.65.
Tin: Straits, 46.50. Pig, 99%, 44.50.
Lead: 4.15. Aluminum, 23.30. Antimony, 6.50.
Nickel: Ingot, 35. Shot, 36. Elec., 35. Pellets, 40.
Quicksilver: Flask, 75 lbs., $62. **Bismuth,** 90.
Cadmium, 55. **Silver,** Troy oz., official price, N. Y., July 5, 36.75.
Gold: oz., Troy, $20.67. **Platinum,** oz., Troy, $22 to $24.

Duties: Copper, 4c. lb.; zinc, 1¼c. lb.; tin, free; lead, 2½c. lb.; aluminum, 4c. lb.; antimony, 2c. lb.; nickel, 3c. lb.; quicksilver, 25c. lb.; bismuth, 7½%; cadmium, 15c. lb.; cobalt, free; silver, free; gold, free; platinum, free.

INGOT METALS AND ALLOYS

	Cents lb.	U. S. Import Duty	U. S. Import Tax*
Brass Ingots, Yellow	6½ to 8½	None	4c. lb.[1]
Brass Ingots, Red	8 to 11	do	do
Bronze Ingots	8 to 13	do	do
Aluminum Casting Alloys	11½ to 15	4c. lb.	None
Manganese Bronze Castings	19 to 32	45% a. v.	3c. lb.[2]
Manganese Bronze Forgings	24 to 36	do	do
Manganese Bronze Ingots	9 to 12	do	4c. lb.[1]
Manganese Copper, 30%	11½ to 16	25% a. v.	3c. lb.[2]
Monel Metal Shot or Block	28	do	None
Phosphor Bronze Ingots	9½ to 12	None	4c. lb.[1]
Phosphor Copper, guaranteed 15%	12 to 16	3c. lb.[2]	do
Phosphor Copper, guaranteed 10%	11 to 16	do	do
Phosphor Tin, no guarantee	50 to 65	None	None
Silicon Copper, 10%	18 to 30	45% a. v.	4c. lb.[1]
Iridium Platinum, 5%	$31.50	None	None
Iridium Platinum, 10%	$33.00	None	None

*Duty is under U. S. Tariff Act of 1930; tax under Section 60 (7) of Revenue Act of 1932.
[1]On copper content. [2]On total weight. "a. v." means ad valorem.

OLD METALS

Dealers' buying prices, wholesale quantities:	Cents lb.	Duty	U. S. Import Tax
Heavy copper and wire, mixed	6 to 6⅛	Free	4c. per pound on copper content.
Light copper	5⅛ to 5⅜	Free	
Heavy yellow brass	3¼ to 3½	Free	
Light brass	2¾ to 3	Free	
No. 1 composition	4¾ to 5	Free	
Composition turnings	4½ to 4¾	Free	
Heavy soft lead	3¼ to 3½	2⅛c. lb.	None.
Old zinc	2⅜ to 2⅝	1½c. lb.	
New zinc clips	3 to 3¼	1½c. lb.	
Aluminum clips (new, soft)	13 to 14	4c. lb.	
Scrap aluminum, cast, mixed	6¾ to 7	4c. lb.	
Aluminum borings—turnings	4¾ to 5¼	4c. lb.	
No. 1 pewter	26 to 28	Free	
Electrotype or stereotype	3⅛ to 3⅜	2⅛c. lb.*	
Nickel anodes	24 to 26	10%	
Nickel clips and turnings	19 to 28	10%	
Monel scrap	9 to 11¾	10% a. v.	

*On lead content.

Wrought Metals and Alloys

The following are net BASE PRICES per pound, to which must be added extras for size, shape, small quantity, packing, etc., as shown in manufacturers' price lists, effective July 5, 1933.

COPPER MATERIAL

	Net base per lb.	Duty*
Sheet, hot rolled	16½c.	2½c. lb.
Bare wire, soft, less than carloads	11 to 11½c.	25% a.v.
Seamless tubing	15⅝c.	7c. lb.

*Each of the above subject to import tax of 4c. lb. in addition to duty, under Revenue Act of 1932.

BRASS AND BRONZE MATERIAL

Net base prices per pound, mill shipments.

	High Brass	Low Brass	Bronze	Duty	U. S. Import Tax
Sheet	13¾c.	15c.	15⅜c.	4c. lb.	4c. lb on copper content
Wire	13¾c.	15c.	15⅜c.	25%	
Rod	11¼c.	14¼c.	15⅛c.	4c. lb.	
Angles, channels	21¾c.		23⅜c.	12c. lb.	
Seamless tubing	15⅜c.		17⅛c.	8c. lb.	
Open seam tubing	21¾c.		23⅜c.	20% a.v.	No tax.

NICKEL SILVER

Net base prices per lb. (Duty 30% ad valorem.)

Grade "A" Sheet Metal		Wire and Rod	
10% Quality	22⅜c.	10% Quality	25¼c.
15% Quality	24½c.	15% Quality	29⅝c.
18% Quality	25¾c.	18% Quality	32⅞c.

TOBIN BRONZE AND MUNTZ METAL

(Duty 4c. lb.; import tax 4c. lb. on copper content.)

Net base prices per pound.	
Tobin Bronze Rod	15c.
Muntz or Yellow Rectangular and other sheathing	15½c.
Muntz or Yellow Metal Rod	12¼c.

ALUMINUM SHEET AND COIL

(Duty 7c. per lb.)

Aluminum sheet, 18 ga., base, ton lots, per lb.	32.30
Aluminum coils, 24 ga., base price	30.00

ROLLED NICKEL SHEET AND ROD

(Duty 25% ad valorem, plus 10% if cold worked.)

Net Base Prices

Cold Drawn Rods	50c.	Cold Rolled Sheet	60c.
Hot Rolled Rods	45c.	Full Finished Sheet	52c.

MONEL METAL SHEET AND ROD

(Duty 25% ad valorem, plus 10% if cold worked.)

Hot Rolled Rods (base)	35	Full Finished Sheets (base)	42
Cold Drawn Rods (base)	40	Cold Rolled Sheets (base)	50

SILVER SHEET

Rolled sterling silver (July 5) 39.75c. per Troy oz. upward according to quantity. (Duty, 65% ad valorem.)

ZINC AND LEAD SHEET

	Cents per lb. Net Base	Duty
Zinc sheet, carload lots, standard sizes and gauges, at mill, less 7 per cent discount	9.00	2c. lb.
Zinc sheet, full casks (jobbers' price)	9.25	2c. lb.
Zinc sheet, open casks (jobbers' price)	10.00 to 10.25	2c. lb.
Full Lead Sheet (base price)	7.75	2⅛c. lb.
Cut Lead Sheet (base price)	8.00	2⅛c. lb.

BLOCK TIN, PEWTER AND BRITANNIA SHEET

(Duty free)

This list applies to either block tin or No. 1 Britannia Metal Sheet, No. 23 B. & S. Gauge, 18 inches wide or less; prices are all f. o. b. mill:

500 lbs. or over	15c. above N. Y. pig tin price
100 to 500 lbs.	17c. above N. Y. pig tin price
Up to 100 lbs.	25c. above N. Y. pig tin price

Lighter gauges command "extras" over the above prices

Supply Prices, July 5, 1933

ANODES

Copper: Cast	16c. per lb.	**Nickel:** 90-92%	42c. to 46c. per lb.
Rolled, sheets, trimmed	14¾c. per lb.	95-97%	43c. to 47c. per lb.
Rolled, oval	14⅜c. per lb.	99%+cast, 45c. to 49c.; rolled, depolarized, 46c. to 50c.	
Brass: Cast	15¾c. per lb.	**Silver:** Rolled silver anodes .999 fine were quoted July 5 from 39.75c., per Troy ounce upward, depending upon quantity.	
Zinc: Cast	9½c. per lb.		

WHITE SPANISH FELT POLISHING WHEELS

Diameter	Thickness	Under 50 lbs.	50 to 100 lbs.	Over 100 lbs.
10-12-14 & 16	1″ to 2″	$2.95/lb.	$2.65/lb.	$2.45/lb.
10-12-14 & 16	2 to 3½	2.85	2.55	2.35
6-8 & over 16	1 to 2	3.05	2.75	2.55
6-8 & over 16	2 to 3½	3.00	2.70	2.45
6 to 24	Under ½	4.25	3.95	3.75
6 to 24	½ to 1	3.95	3.65	3.45
6 to 24	Over 3½	3.35	3.05	2.85
		Any Quantity		
4 to 6	Under ½,	$5.00	½-1, $4.85	1 to 3, $4.75
1½ to 4	"	5.55	" 5.40	" 5.35
1 to ½	"	5.85	" 5.70	" 5.60

Extras: 25c per lb. on wheels, 1 to 6 in. diam., over 3 in. thick. On grey Mexican wheels deduct 10c. per lb. from above prices.

COTTON BUFFS

Full disc open buffs, per 100 sections when purchased in lots of 100 or less were quoted July 1:

11″ 20 ply 64/68 Unbleached	$21.00 to 23.00
14″ 20 ply 64/68 Unbleached	35.49 to 39.45
11″ 20 ply 80/92 Unbleached	24.90 to 27.75
14″ 20 ply 80/92 Unbleached	41.63 to 46.05
11″ 20 ply 84/92 Unbleached	30.16 to 33.05
14″ 20 ply 84/92 Unbleached	50.41 to 55.30
Sewed Pieced Buffs, per lb., bleached	30c. to 70c.

CHEMICALS

These are manufacturers' quantity prices and based on delivery from New York City.

Acetone	lb.	.08-09
Acid—Boric (Boracic) granular, 99½+% ton lots	lb.	.04½-.05
Chromic, 75 to 400 lb. drums	lb.	.11½-.17½
Hydrochloric (Muriatic) Tech., 20 deg., carboys	lb.	.02
Hydrochloric, C. P., 20 deg., carboys	lb.	.06
Hydrofluoric, 30%, bbls.	lb.	.08-.12
Nitric, 36 deg., carboys	lb.	.06-.06½
Nitric, 42 deg., carboys	lb.	.07-.08
Sulphuric, 66 deg., carboys	lb.	.02
Alcohol—Butyl	lb.	.095-.11
Denatured drums	gal.	.475-.476
Alum—Lump, barrels	lb.	.03¼-.04
Powdered, barrels	lb.	.03½-.05
Ammonia, aqua, com'l., 26 deg., drums, carboys	lb.	.02¾-.05
Ammonium—Sulphate, tech., bbls.	lb.	.03½-.05
Sulphocyanide, technical crystals	lb.	.28-.37
Arsenic, white, kegs	lb.	.04½-.05
Asphaltum	lb.	.35
Benzol, pure	gal.	.58
Borax, granular, 99½+%, ton lots	lb.	.02¼-.02¾
Cadmium oxide, 50 to 1,000 lbs.	lb.	.55
Calcium Carbonate (Precipitated Chalk)	lb.	.05¾-.07½
Carbon Bisulphide, drums	lb.	.05½-.12
Chrome Green, bbls.	lb.	.18
Chromic Sulphate	lb.	.30-.40
Copper—Acetate (Verdigris)	lb.	.22
Carbonate, bbls.	lb.	.14½-.20
Cyanide (100 lb. kgs.)	lb.	.38
Sulphate, bbls.	lb.	3.50-4.20
Cream of Tartar Crystals (Potassium Bitartrate)	lb.	.20¼-.20½
Crocus	lb.	.15
Dextrin	lb.	.05-.08
Emery Flour	lb.	.06
Flint, powdered	ton	$30.00
Fluorspar, bags	lb.	.03½
Gold Chloride	oz.	$12.00
Gum—Sandarac	lb.	.26
Shellac	lb.	.32-.34
Iron Sulphate (Copperas), bbls.	lb.	.01½
Lacquer Solvents	gal.	.85
Lead—Acetate (Sugar of Lead)	lb.	.10-13½
Yellow Oxide (Litharge)	lb.	.12½
Mercury Bichloride (Corrosive Sublimate)	lb.	$1.58
Methanol, 100% synth., drums	gal.	.41½
Nickel—Carbonate, dry, bbls.	lb.	.35
Chloride, bbls.	lb.	.16-.21
Salts, single, 300 lb. bbls.	lb.	.11-.13
Salts, double, 425 lb. bbls.	lb.	.11-.13
Paraffin	lb.	.05-.06
Phosphorus—Duty free, according to quantity	lb.	.35-.40
Potash Caustic Electrolytic 88-92% broken, drums	lb.	.08-.093
Potassium—Bichromate, casks (crystals)	lb.	.08
Carbonate, 96-98%	lb.	.07½
Cyanide, 165 lbs. cases, 94-96%	lb.	.57½
Pumice, ground, bbls.	lb.	.02½
Quartz, powdered	ton	$30.00
Rosin, bbls.	lb.	.04½
Rouge—Nickel, 100 lb. lots	lb.	.25
Silver and Gold	lb.	.65
Sal Ammoniac (Ammonium Chloride) in bbls.	lb.	.05-.05½
Silver—Chloride, dry, 100 oz. lots; Cyanide (fluctuating); Nitrate 100 ounce lots		Prices subject to rapid fluctuations of silver market.
Soda Ash, 58%, bbls.	lb.	.023
Sodium—Cyanide, 96 to 98%, 100 lbs.	lb.	.16½-.22
Beryllium fluoride ($2NaF.BeF_2$)	lb.	4.30-7.00
Hyposulphite, kegs, bbls.	lb.	.03½-.06½
Metasilicate, granular, bbls.	lb.	.03-.04
Nitrate, tech., bbls.	lb.	.03¼-.07
Phosphate, tech., bbls.	lb.	.03¾
Silicate (Water Glass), bbls.	lb.	.01½
Stannate, fluctuating	lb.	.35
Sulphocyanide	lb.	.30-.45
Sulphur (Brimstone), bbls.	lb.	.02
Tin Chloride, fluctuating, 100 lb. kegs	lb.	.36½
Tripoli, powdered	lb.	.03
Wax—Bees, white, ref. bleached	lb.	.60
Yellow, No. 1	lb.	.45
Whiting, Bolted	lb.	.02½-.06
Zinc—Carbonate, bbls.	lb.	.11
Chloride, drums, bbls.	lb.	.07½-.10
Cyanide (100 lb. kegs)	lb.	.38
Sulphate, bbls.	lb.	.03½

Leadership

MANUFACTURER

"Yes, we've noticed a substantial reduction in our plating costs since installing Udylite."

ENGINEER

"We're certainly pleased with the Udylite Process and the full-automatic equipment you sold us. Your service engineers help us keep efficiency up and costs down."

doesn't just happen—
IT IS EARNED

SUPERINTENDENT

"We've only been in trouble once . . . that time we needed help—quick. A wire brought your service engineer . . . he corrected the difficulty. That's service."

PLATING FOREMAN

"The Udylite bath is easy to control and plates bright. I don't have a bit of trouble but if I ever do I'll call your service man."

WORKS MANAGER

"The Udylite Process has always produced satisfactory results. We are especially pleased with the speed at which we are able to do Udylite-Cadmium plating."

PURCHASING AGENT

"Your prices are in line and deliveries are prompt. Our plater tells me that your service men have helped him a lot."

WE point with pride to more than one thousand plants where the Udylite Process is producing superior cadmium coatings.

Do you know *why* the Udylite Process is so consistently chosen? Here's the reason. Udylite provides not only a simplified economical method of applying cadmium but also a combination of services which involve no extra cost and mean so much.

When you have Udylite, you have all the technical facilities of the pioneer company—the pioneer company—at your command.

Read the comments reproduced on this page. They are typical of what industrial leaders are saying about Udylite. Then drop us a line. We'll show you what *real* service means.

INSPECTOR

"Since Udylite has been installed I can see an improvement in the quality of our finish. It's brighter and there are fewer rejects."

The Udylite Process and Udylite Service are described in this booklet. Write for it.

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